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COMPUTERWORLD

INSIDE

Desktop MIPS war

Coastal rivals ready single-user supercomputers

BY STANLEY GIBSON
and JULIE PITTA
CW STAFF

It's happening again.

In the grand tradition of the computer industry's East Coast-West Coast rivalries, two young companies are set to go head-to-head, pitting new but contrasting technologies and distinct corporate cultures against one another in a race to put near-supercomputer power on a desktop.

Ardent Computer Corp. in Sunnyvale, Calif., and Stellar Computer, Inc. in Newton, Mass., are planning March rollouts for "desktop supercomputers." The machines will reportedly bring 20 million to 60 million instructions per second, 40 million to 60 million floating-point operations per second and elaborate graphics to a single user for less than $100,000.

Art to engineers

The machines fill a gap between current high-end workstations and minisupercomputers, combining features of both. Key applications are expected to be molecular modeling, computational fluid dynamics and computer animation. One goal, the firms said, is to get scientists and engineers to start thinking of their applications in terms of pictures.

Neither product has been formally announced, but the companies have already begun competitively bidding their machines.

Continued on page 8

OS/2 team heads off code fears

BY ALAN ALPER
CW STAFF

NEW YORK — Looking to head off a controversy over minor differences between their versions of the OS/2 operating system, Microsoft Corp. and IBM last week went to great lengths to proclaim that the packages are functionally identical.

The differences between Microsoft's MS OS/2 and IBM's OS/2 relate primarily to hardware configuration support, installation and documentation, company officials said. Those variances are transparent to the average end user, since the application program interface, user interface and command sets of each are exactly the same, the officials added.

Because Microsoft is offering OS/2 to personal computer makers other than IBM, its version supports a broader array of third-party hardware configurations, including support for systems using the IBM Personal Computer AT bus in conjunction

Continued on page 15

Computer firms braced against takeover winds

BY CLINTON WILDER
CW STAFF

ANALYSIS

Prime Computer, Inc.'s use of hostile takeover techniques to acquire Computervision Corp. is a rare strategy among computer vendors — and is likely to remain so.

Even if Prime's $391.5 million buy-out offer is successful, the battle heating up along Massachusetts' Route 128 does not portend a wave of unwanted suitors seeking takeover targets.

In the uncertain financial times following the "Crash of '87," the computer industry should remain relatively insulated from the activities of corporate raiders and conglomerate builders.

Prime's attempted takeover stems not from the financial motivation to take advantage of a depressed stock price but from the strategic desire to dramatically expand its presence in the computer-aided design and man-

Continued on page 96

Mechanically inclined

If Prime's hostile takeover bid to acquire Computervision succeeds, a powerful new force in the CAD/CAM market will emerge

	Revenue[2]	Profits[2]	Employees	CAD/CAM revenue[3]
Prime	$910.2M	$46.9M	6,000	10%
Computervision	$404.7M	−$5.7M	4,700	100%

[1] Last full fiscal year [3] Percent of company's total revenue

CW CHART

Because *anyone* can get a 3090

BY KATHY CHIN LEONG
CW STAFF

What the BMW is to a yuppie, the Cray supercomputer is to a scientist — a symbol of prestige. It's fast, it's powerful, and it's expensive.

Since Seymour Cray began product development at his Chippewa Falls, Wis., lab in 1972, Cray Research, Inc. has delivered more than 130 of the supercomputer behemoths to 113 customers. Users range from Ford Motor Co. in Detroit to Abu Dhabi National Oil Co. in the Middle East.

While large MIS shops can easily order 100 personal computers, when it comes to multimillion-dollar Crays, customers can barely justify one. Whereas an IBM Personal Computer AT can be perched atop a desk, an 11,000-pound Cray X-MP/4 series is often housed in its own chambers with extra supports so that the machine will not penetrate, let alone scratch, the flooring.

Cray customers have unusual computing needs that cannot be met by commercial mainframes. Some zealous Cray users say Crays are needed to ensure that the U.S. remains a leader in aerospace weaponry. Others are convinced that the use of a Cray will enable them to prolong human life through better drug development.

Certainly, Cray isn't the only game in town when it

Continued on page 97

Supercharged

Independent estimate designates Cray as the clear leader in the relatively small but lucrative market for supercomputers

*Excludes internal systems

INFORMATION PROVIDED BY A 1987 PIPER, JAFFRAY & HOPWOOD FORECAST
CW CHART: FRANK C. O'CONNELL

NEWSPAPER

SECOND CLASS

IN THIS ISSUE

Apple harvest. Apple readies three upgradable laser printers — including a low-end Canon LBP-SX-based model and a high-end 68020 unit — and 40M-byte 3½-in. internal hard disk version of the Mac SE for Macworld debut. Page 4.

No experience necessary. Beta-testers praise simplicity of Pansophic's mainframe EZ/IQ and PC-based Easytrieve Plus-NL query and report-writing packages. Page 12.

New forms of mainframe connection. Follows page 64.

Quotable

"Any program written for [MS] OS/2 will run on OS/2, whether it's from IBM or any other vendor."

ADRIAN KING
MICROSOFT CORP.

See story page 1.

Sematech finds home

Semiconductor group chooses Austin as base

BY JAMES A. MARTIN
CW STAFF

AUSTIN, Texas — Sematech, the consortium created last year to help the U.S. semiconductor industry compete against the Japanese, announced last week it has selected this southern Texas city as the site for its headquarters and manufacturing operations.

Sematech plans to set up shop during the first quarter of this year in a 300,000-sq-ft building, a former Data General Corp. manufacturing site. Manufacturing efforts will begin by year's end, a spokesman said.

Austin is also home to Microelectronics and Computer Technology Corp. (MCC), a technology consortium similar in concept, and observers said the two organizations will most likely combine forces in the semiconductor arena.

Overlap in membership

MCC is divided into four research programs, including the semiconductor packaging and integration sectors. The two consortia have in common several corporate members, including National Semiconductor Corp. and Advanced Micro Devices, Inc. Although no formal alliance has been discussed, some type of joint effort between the consortia is likely in the future, according to Jeanne Lock, director of communications for Sematech.

"Austin is a rational decision because of the semiconductor manufacturing infrastructure already in place," said Howard Dicken, president of DM Data, Inc., a semiconductor industry watchdog in Scottsdale, Ariz. "They'll fit in with MCC, Motorola and the others there."

Sematech will employ roughly 7,000 to 8,000 workers, half of whom will be permanent. The others will be on "temporary tour of duty," on loan from a corporation to learn new techniques of manufacturing and bring them back to their respective companies, Locke said.

Texas was chosen as Sematech's home base over 11 other states, including California, Arizona, Massachusetts, North Carolina and Oregon. As a consolation, each of those states will be awarded a $50,000 grant to create semiconductor research projects at the university level.

Sematech was founded last May as a branch of the Semiconductor Industry Association with the purpose of developing advanced chip manufacturing technologies that most companies can no longer afford to develop on their own.

U.S. agency fire harms machines, not data

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The National Rural Electric Cooperative Association (NRECA) spent the holiday season cleaning up after a two-alarm fire that destroyed about 30 terminals and personal computers and spewed black soot throughout the association's data center.

The fire, with temperatures reaching 2,000 degrees, turned several terminals into "black blobs" of melted plastic, according to NRECA spokesman Bob Nelson. "Heat, soot and water took a heavy toll," he said.

The Dec. 21 fire ravaged administrative offices on the third floor of the NRECA building — damages are estimated at $3.3 million — but the computer room on the fourth floor suffered only from smoke and soot, sources said.

"As far as I can tell, every piece of electronic equipment we had on the third floor was lost," said Michael Knapp, the NRECA's supervisor of computer operations. He said much of the equipment on the second floor suffered water damage.

Cleanup duty

I/O Magnetics, Inc., a computer maintenance firm in Columbia, Md., was brought in to clean up the computer room and equipment, including an IBM 4361, a Honeywell, Inc. DPS 8, a Wang Laboratories, Inc. word processing system, disk drives, disk packs, 4,000 reels of magnetic tape and some 100 terminals and PCs, according to John C. Mattey, national account manager.

Knapp said the Honeywell computer is operating but that the IBM 4361 is questionable and may have to be replaced.

The association did not lose any mainframe data but is nevertheless thankful that it had a backup policy of copying data onto magnetic tape for off-site storage, Nelson said. He said other trade associations have inquired about the disaster recovery effort, apparently worried about what would happen if they were struck by fire.

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OS/2 test draws vendor barbs

BY ALAN J. RYAN
CW STAFF

REDMOND, Wash. — Microsoft Corp. and IBM last week criticized an independent benchmark test comparing OS/2 with Unix, likening it to a comparison of dissimilar fruits.

Neal Nelson, originator of the suite of 18 tests that compare the operating systems' speeds in one to 20 simultaneous applications, said he stands behind his findings. The results showed that OS/2 can run up to seven times slower than Unix [CW, Dec. 28, 1987/Jan. 4, 1988].

Microsoft's Xenix, marketed by The Santa Cruz Operation, Inc. as SCO Xenix 386, which was used in the test, is optimized for the Intel Corp. 80386 processor. Nelson "would have to look at SCO Xenix 286 to have a fair comparison," because OS/2 is optimized for an Intel 80286-based processor, said Marty Taucher, a Microsoft spokesman. "It's like comparing apples to oranges."

Nelson, however, argued that comparing OS/2 to Xenix optimized for the 286 chip would be "like comparing an '87 Ford to a '65 Chevrolet." OS/2 and SCO Xenix 386 "are the current products for sale in both categories. If a customer is trying to decide what he wants to buy, this is the choice available," he said. IBM released Version 1.0 of OS/2 Dec. 4.

> "THERE'S a million ways you can do benchmarks, and you get whatever kinds of results you set out to find."
>
> SCOTT BROOKS
> IBM

"There'a a million ways you can do benchmarks, and you get whatever kinds of results you set out to find," said Scott Brooks, an IBM information representative for OS/2. "We've done some benchmarks for our own internal use, and OS/2 matched up favorably with Xenix," he added.

Brooks said, however, that he was uncertain about which Xenix version the IBM comparison had used.

Users contacted last week had mixed reactions to the test, with some saying they choose an operating system first to run certain applications and second for its performance.

"Because OS/2 functionally is very much like the Unix-type environment, from a customer's point of view, I would be concerned if the performance is not nearly as good [as that of Unix]," said Henwell Chou, second vice-president at Travelers Insurance Co. in Hartford, Conn., and an early OS/2 user.

But, Chou added, "We cannot make a selection just based on performance, because, primarily, we are based on the application software. However, if we see there is room for IBM to improve their performance, we would voice that concern and ask them to tune their software better."

Another user said the OS/2 vs. Unix comparison might have been acceptable 10 years ago, when the computer industry's evolution was slower. But today, he said, the test represents a closet-type view.

George Kurowski, director of nontraditional information system development at Connecticut Mutual Life Insurance Co. in Hartford, said the test "doesn't necessarily portray an accurate comparison if you project it a year from now."

Disturbing discrepancies

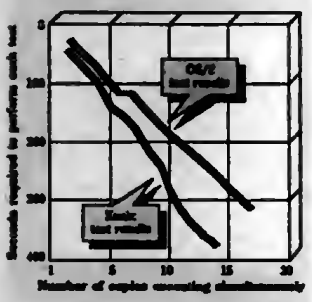
Daniel Cavanagh, senior vice-president of MIS at Metropolitan Life Insurance Co. in New York, said his company is exploring Unix for special applications and OS/2 for other applications. While he said he would not be surprised if the newer operating systems were slower than Unix — which has been in the works for nearly 20 years — he added that if Nelson's results were accurate, the magnitude of the performance differences would be disturbing.

The test results are important, Nelson claimed, because they tell users looking at a distributed network with OS/2 as the operating system that they will have to size their hardware according to the efficiency of OS/2. "If they've been doing testing and development under DOS or Xenix but want to put it under OS/2, they might have to buy a more powerful machine," he added.

Nelson's firm, Neal Nelson & Associates, ran the suite of tests on its OS/2 Business Benchmark software. The comparison was conducted on an IBM Personal System/2 Model 80 with a 70M-byte hard disk, 2M bytes of memory and a 16-MHz clock.

OS/2 vs. Xenix

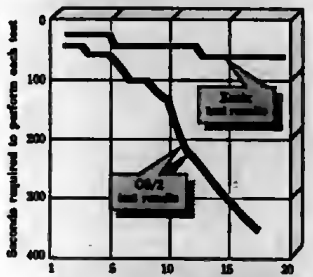
Comparison of OS/2 and Xenix for a task that performs 100,000 calculations with 64-bit, double-precision floating-point numbers— similar to an engineering or scientific application



INFORMATION PROVIDED BY NEAL NELSON & ASSOCIATES
CW CHART

OS/2 or Slow/S2?

Comparison between OS/2 and Xenix for a task that includes 16- and 32-bit integer math, function calls, loops and sequential and random disk I/O



INFORMATION PROVIDED BY NEAL NELSON & ASSOCIATES
CW CHART

Apple readies printer crop for Macworld

BY JULIE PITTA
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. is expected to launch three laser printers and an upgraded version of its Macintosh SE personal computer next week at Macworld.

Sources who previewed the products said the laser printers offer 300 dot/in. resolution and are based on the Canon U.S.A., Inc. LBP-SX print engine, an upgrade from the LBP-CX engine used in Apple's existing Laserwriter and Laserwriter Plus printers. Both those products will eventually be phased out in favor of the new line.

At the low end of the line is a single-user printer that one user compared with General Computer Co.'s Personal Laserprinter. Its price is expected to be about $2,000.

A mid-range networking printer slated to be introduced at the show is based on Motorola, Inc.'s 68000 microprocessor. At the high end of the line, Apple is expected to introduce a laser printer based on Motorola's 68020 microprocessor.

An external disk drive may be connected to the high-end printer so that multiple jobs may be stored.

All three systems will offer one or two slots to allow upgrades, according to Apple. "The key issue is that they're upgradable," a source said. "Boards can be added so that you can start with one and build it up to be a higher end version."

The printers appear to be an extension of Apple's open architecture philosophy, which began with the introduction of the Macintosh II and the Mac SE PCs last year. A criticism of earlier Apple systems was users' inability to expand them with third-party options. The Mac II and Mac SE were the first Apple systems to offer expansion slots.

Additionally, Apple will introduce a version of its 68000-based Mac SE with a 40M-byte 3½-in. internal hard disk drive. Originally, the Mac SE came configured with either two floppy disk drives or one floppy and one 20M-byte 3½-in. hard drive.

Moving toward standard

"When you look at the MS-DOS world, the move is toward 40M bytes of storage," said Bill Lempesis, a PC industry analyst for Dataquest, Inc. "Most of the [Intel Corp.] 80286-based machines out there are configured with a 40M-byte drive.

"If Apple wants to compete in business with those DOS machines, they need to move to 40M bytes," Lempesis continued. "It's pretty much the standard."

In other introductions, Apple is expected to add a read-only optical disk drive subsystem for the Mac, designed to work with Hypercard from Apple.

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COMPUTERWORLD

MIS '87 salary gains average 7%

Silicon Valley, Boston, Midwest, Florida lead in pay increases

BY DAVID A. LUDLUM
CW STAFF

SAN MATEO, Calif. — Salaries for data processing managers and professionals climbed an average of 7.1% late last year from a year earlier, with a range of regions sharing relatively strong growth, according to an annual survey.

DP pay increases were paced by salaries at electronics firms in Silicon Valley and the Boston area, manufacturers in Midwestern cities such as Chicago and Minneapolis and fast-growing Florida, according to the survey, which was conducted by recruitment firm Source Services Corp.

"It's not just old people who are moving to Florida. There are the beginnings of a high-tech belt in the Tampa area," said Steve Joffey, vice-president for the EDP Division of Source Services. The survey also indicated some "rebirth" of salary growth in Texas with rising oil prices, Joffey said.

The annual survey measured salaries for 22 DP job titles, including computer operator, five categories each of programmer/analyst and six management classifications.

An individual's pay, however, is likely to hinge on his skills and the specific demands of the job more than on the title, and demand for specific skills varies greatly from city to city, Joffey said.

Variable scale

Programmers are likely to have won larger than average pay raises for skills in data communications and networks, new data bases and fourth-generation languages, particularly in mini- and microcomputer environments, Joffey said.

"Those are the people that are getting ahead faster because they are in more demand," he added.

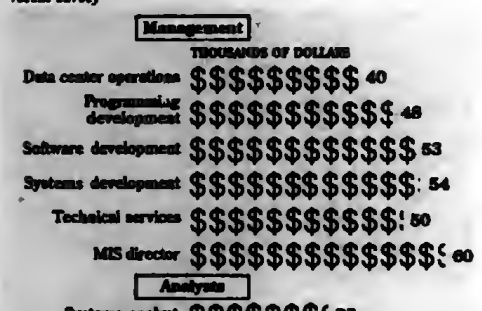
But pay may also vary with a DP worker's knowledge of a specific business and its applications, he said.

"If they're in a geography whereby the thriving business is electronics, and they do payroll and personnel, they're not going to be at the apex of the learning curve in their marketplace. There's a dual problem in every marketplace — business and technology."

A third factor that can drive DP pay higher is "people skills" called for in developing systems from user requirements, Joffey said.

Systems salaries

Median salaries for DP managers and analysts, according to a recent survey*



* Managers' experience varies; analysts have four to six years of experience

INFORMATION PROVIDED BY SOURCE SERVICES CORP.
CW CHART

Timeplex plans family of packet switches

BY ELISABETH HORWITT
CW STAFF

WOODCLIFF LAKE, N.J. — Timeplex, Inc. will fill out its data communications product line with a complete packet-switching family, to be announced tomorrow, the company told *Computerworld* last week.

The Timepac X.25 Packet Switching family will include the Timepac Nodal Processor 100 and 500 packet switches. A single Nodal Processor is said to handle throughput of up to 500 packet/sec. Multiple processors can be clustered together, allowing users to start at the low end and then add switching capacity in a modular fashion, according to Timeplex. The clustered system thus "provides network solutions from entry level to the largest private networks," the spokesman said.

The Nodal Processors are said to automatically perform management and reconfiguration functions during the process of adding new nodes to the packet-switching network. Up to 10,000 nodes can be networked together, Timeplex said.

Another member of the Timepac family, the Timepac Packet Assembler-Disassembler, concentrates data from terminals and hosts so that it can be transmitted over a public X.25 network or to a private network of Nodal Processors, Timeplex said.

With the addition of the Timepac family, "Timeplex now offers all the things you need in a telecommunications shop," said Joaquin Gonzalez, vice-president of enterprise networking strategies at Stamford, Conn., research firm the Gartner Group, Inc. "They're really becoming an end-to-end full-communications supplier." In addition to its X.25 offerings, Timeplex's products include statistical multiplexers and T1 switches.

All in one

More and more Gartner Group clients say they like the idea of having one source for their networking needs because of their increasing emphasis on getting all of their communications devices to work together under a single network management system, according to Gonzalez. "And the only way to ensure that, at least for the next three to five years, is to get everything from one vendor."

While the Timeplex spokesman would not elaborate on how the Timepac family will be integrated with its other data communications product lines, he said that "Timepac is an integral part of the integrated systems Timeplex offers customers to meet their specific networking needs."

Timeplex's ability to provide packet switching also makes the company more attractive to its future acquirer, Unisys Corp., Gonzalez said. "A number of people have been saying that Unisys would do better to buy a packet-switching firm, [based on the belief that] T1 is only a passing fancy, and X.25 is getting hot, especially since IBM began supporting it."

Users: IBM, Novell offer choice LAN products

BY KATHY CHIN LEONG
CW STAFF

SANTA CLARA, Calif. — Local-area network users show a strong preference toward the Novell, Inc. Netware operating system and IBM Personal Computer XT and AT file servers, according to a recent buying trends report. In 1988, the survey forecasts, users will continue to flock to Novell for operating system software and to IBM for Personal System/2 micros as network servers.

In its October survey of 160 institutions, including large and medium-size businesses, universities and federal and state governments, Infonetics, Inc. discovered that Novell topped IBM and 3Com Corp. when it came to operating system software.

In 1987, 38% of the respondents had installed Netware, while 27% of the users had the IBM PC LAN program. 3Com's 3+ operating system had secured installations in 9% of the users' offices.

According to Nina Burns, the analyst who compiled the findings, Novell made a strong showing for several reasons. "Users perceive Netware as having the strong performance these companies require. Novell has a handle on in-depth support of other vendors' hardware products, such as [IBM's] Token-Ring and Ethernet." She also stressed that IBM's relationship with Novell as a Netware reseller has given users confidence in Novell products.

Not good for 3Com

3Com's showing in the operating systems arena was relatively low and is expected to remain at 9% this year. Burns noted that users in the survey said they were confused about 3Com's relationship with Microsoft Corp. and what the LAN Manager could do.

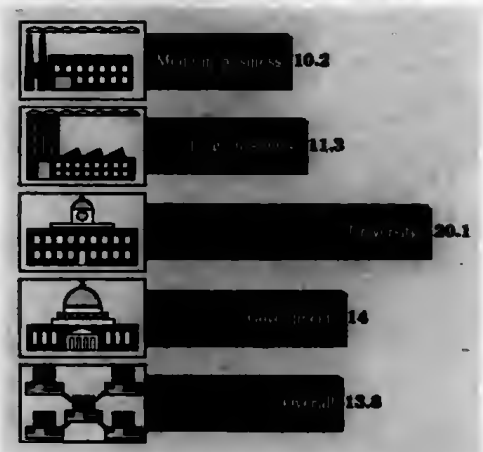
Novell topped IBM mainly because users perceive the IBM LAN program as slow and limited in its support for only IBM products. And even though IBM announced OS/2 Extended Edition with new networking facilities, Burns said that will not impact Netware's clout — at least this year.

Meanwhile, with Novell in second place this time, IBM took the lead in its installed base of file servers, with 51% of the respondents saying they were using PC ATs and XTs in their work groups. Burns stressed that IBM micros were viewed as industry-standard machines that can run various types of operating systems. Also, users with XTs and ATs were able to turn these micros into file servers, thereby saving hundreds of dollars.

Surprisingly, while the PS/2 had been on the market for less than six months, the study showed that 5% of the respondents were using the machines. The purchase of XT and AT file servers will diminish this year, giving way to the PS/2 and other vendors' Intel Corp. 80386-based computers.

Network hub

Recent survey of 160 organizations using local-area networks indicates average number of PCs hooked up to each LAN server



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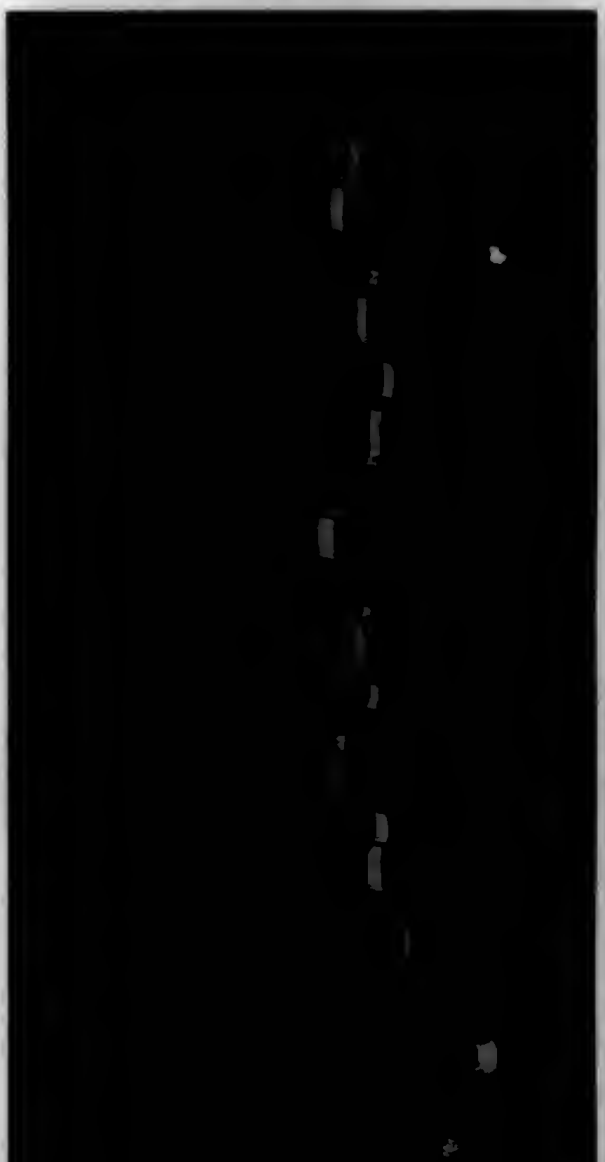

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DEC, Wang bail out of Air Force bid

BY JAMES CONNOLLY
CW STAFF

Both challengers of the U.S. Air Force's bid specifications on a $4.5 billion office automation contract — Digital Equipment Corp. and Wang Laboratories, Inc. — have quietly withdrawn from the bidding process.

The vendors, which last year filed protests claiming that Air Force requirements for AT&T's Unix System V favor AT&T as a bidder, recently notified the Air Force that they will not submit proposals. Wang and DEC told Air Force officials that the time and cost involved in complying with revised requirements prohibited them from bidding.

With the elimination of DEC and Wang from the bidding, AT&T, IBM, Unisys Corp. and Prime Computer, Inc. reportedly remain as major vendors vying for the Air Force contract, which involves supplying up to 20,000 Unix-based mid-range computers along with software, services and peripherals.

DEC's and Wang's letters to Air Force officials were sent Dec. 23, about two months after an administrative law judge partially upheld the vendors' challenge to the bid specifications and called for the Air Force to revise the requirements.

Unequal terms

DEC and Wang charged that the original specifications favored AT&T by calling for AT&T's System V Interface Definition (SVID) and System V Verification Suite.

DEC and Wang claimed the specification left open the possibility that AT&T could unfairly judge other vendors on their compliance with SVID and that requiring the use of SVID — rather than the emerging standard Posix — hurts bidders by forcing them to pay royalties to AT&T.

Although the Air Force revised its request for proposals (RFP) and set a new bid deadline of Dec. 23, DEC and Wang said the revisions still bar them from making competitive bids.

One DEC official said the revisions may have made AT&T's position more favorable.

In a prepared statement, a Wang spokesman last week said, "Even though the RFP was revised as a result of the recent protest, Wang has concluded that the chances of competing successfully for the award were low. In our judgment, it was not economic for us to pursue further this procurement opportunity."

DEC spokesman Frank Donovan said DEC considered re-engineering its Ultrix operating system but discovered that the work could not be done in time to fulfill the contract.

MIPS war

FROM PAGE 1

If nothing else, Ardent has won an early lead in feistiness, boldly claiming superiority and even denigrating Stellar. "Our engineers have done a *stellar* job. Theirs haven't," sniffed Allen H. Michels, chairman and chief executive officer of Ardent.

The rivalry follows the paradigm of American computing in the tradition of Sun Microsystems, Inc. vs. Apollo Computer, Inc.; Alliant Computer Systems Corp. vs. Convex Computer Corp.; and in microcomputers, Apple Computer, Inc. vs. IBM. These contests match competitors from disparate geographic locations in a struggle for sales and technology leadership.

Stellar's Poduska

Stellar Computer, Inc.
Newton, Mass.

Management team: *John William Poduska Sr., chairman and chief executive officer; Arthur Carr, president and CEO.*

Product description: *"Graphics supercomputer."*

Founded: *December 1985.*

Venture capital funding: *A total of $30 million raised in two rounds. Major investors include Poduska, Greylock Management Corp. and Hambrecht & Quist, Inc.*

Number of employees: *100 total; 60 in engineering.*

Anticipated product rollout date: *March 1988.*

Limelight leaders

Ardent and Stellar are both led by executives who are well known to each other and to the industry. Stellar's founder and CEO, John William Poduska Sr., is a founder of Prime Computer, Inc. and Apollo. Ardent, which changed its name from Dana Computer, Inc. in December, is led by Michels, the flamboyant founder of Convergent Technologies, Inc.

"The difference between us and Stellar is that we can do very good graphics, but we compute like a supercomputer. We look like a Cray inside; they look like a workstation," asserted Gordon Bell, Ardent's vice-president of engineering, research and development, referring to Cray Research, Inc. supercomputers. Bell is widely known as the designer of Digital Equipment Corp.'s VAX architecture and Encore Computer Corp.'s Multimax parallel processor.

Stellar's Poduska hesitated to disparage his rival. He professed that Michels and Bell are both longtime friends and that he has deep respect for their abilities.

"There are an awful lot of good people at Ardent. They are capable of doing lots of things," he said.

Poduska, a recent father at 50 years old, preferred to bubble with paternal enthusiasm for his newest offspring, the Stellar workstation. "It's a crackerjack," he exulted.

Despite Ardent's claims of leadership, technical computing analyst Vicki Brown at International Data Corp. (IDC) in Framingham, Mass., said Stellar has been beating out Ardent in early bidding. Poduska, while expressing reservations about the certainty of early orders, said Stellar is winning its share and may be ahead of Ardent in number of victories. He claimed Stellar has some $3 million in orders to date.

But Ardent's vice-president of sales, Steven Blank, strongly disagreed. "We've beaten them four times in a row — everywhere we've been, except for the first bid. They haven't won one since."

That bid, which was at the National Institute for Health in Bethesda, Md., was decided last fall. Both Stellar and Ardent machines performed comparably, but Stellar's price was lower for a complete system, an institute spokesman said.

The heart of the Stellar machine consists of 45 proprietary application-specific integrated circuit microprocessors. Fabrication of the chips was recently completed by LSI Logic Corp. in late December. The processors ran the AT&T Unix System V, Release 3.1 operating system for the first time last week, according to Poduska.

The CMOS microprocessors, which are not reduced instruction set computer (RISC) chips, were designed by Stellar engineers on a battery of Sun and Apollo workstations. Poduska said the equipment stands ready as a "cannon" to be aimed at yet more powerful microchips.

In contrast to the in-house design of Stellar's product, Ardent is basing its system, code-named Titan, on a Mips Computer Systems, Inc. RISC processor for integer computing, in combination with a custom-made vector processor. The board set is made by Silicon Graphics, Inc.

Problem chips?

Workstation analyst Charles Foundyller, president of Daratech, Inc. in Cambridge, Mass., expressed some skepticism about Stellar's chances for success using a new, powerful microprocessor of proprietary design. He pointed to development problems encountered by Intergraph Corp.'s Clipper chip and IBM's RT Personal Computer RISC chip.

Poduska countered that the Stellar chips have already been tested extensively in simulation.

Early figures released by both companies to IDC show that Ardent claims a lead in MIPS and MFLOPS and in Gouraud-shaded triangles per second, a measure of graphics performance. Stellar, however, boasts wider bandwidth, which, IDC's Brown says, may be a more significant advantage. "Bandwidth today is the limiting factor. It may give Stellar an edge," she said.

Brown also poked holes in early performance claims. "These things mean nothing until you see one of the machines working. I would never believe what anyone says about graphics benchmarks," she said.

Ardent is claiming a price in the $70,000 range, in contrast to Stellar's, which is close to $100,000.

"In the long-term, the difference will be in software," said Michael Burwen, president of the Palo Alto Management Group. "The major issue will be which company attracts the most third-party developers. That's a complete unknown."

Ardent's Michels

Ardent Computer Corp.
Sunnyvale, Calif.

Management team: *Allen H. Michels, chairman, president and CEO; C. Gordon Bell, vice-president of engineering, research and development.*

Product description: *"Single-user supercomputer."*

Founded: *October 1985.*

Venture capital funding: *$32 million in two rounds, including $13 million from Crown Advisors and Kleiner, Perkins, Caulfield & Byers.*

Number of employees: *88 total; 68 in engineering.*

Anticipated product rollout date: *March 1988.*

The next step

A new level of workstation performance is expected to develop with March introductions from Stellar and Ardent

Performance	• 25 MIPS[1] integer • 40 MFLOPS[2] double-precision	• 40 MIPS integer • 64 MFLOPS peak, 6 MFLOPS compiled Linpack benchmark
Memory	• 16M to 128M bytes • 320M byte/sec. data transfer to and from main memory, 640M byte/sec. graphics memory bandwidth	• 8M to 128M bytes • 256M byte/sec. bus bandwidth
Operating system	• AT&T Unix System V, Release 2.1	• Unix System V, Release 3.1
Standards compliance	• X Windows, TCP/IP,[3] NFS,[4] PHIGS+[5]	• X Windows, TCP/IP, NFS, PHIGS+
Price	• Less than $100,000	• Less than $100,000

[1] Millions of instructions per second
[2] Millions of floating-point operations per second
[3] Transmission Control Protocol/Internet Protocol
[4] Network File System
[5] Programmer's Hierarchical Interactive Graphics Standard

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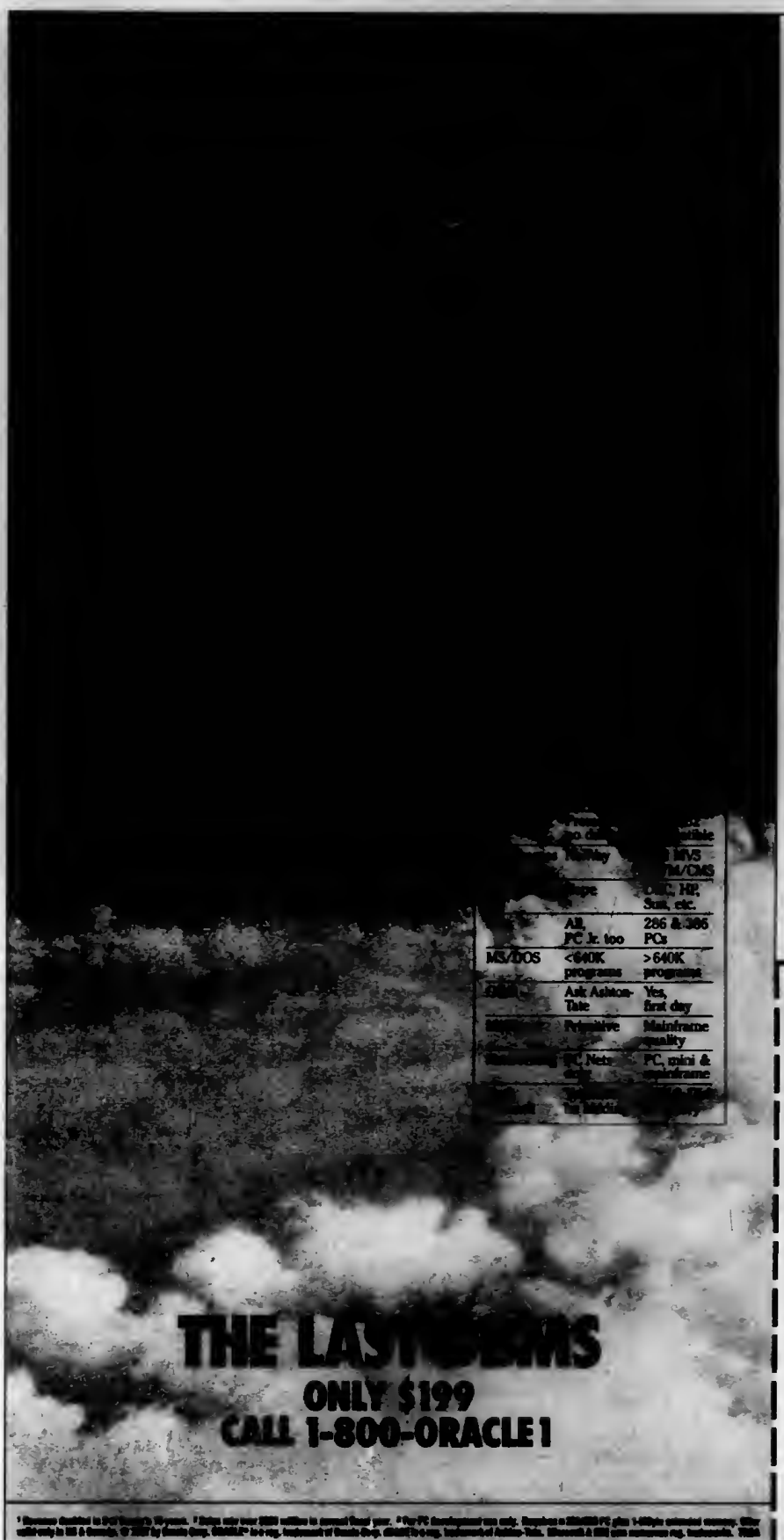

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M&D builds onto line

BY CHARLES BABCOCK
CW STAFF

NATICK, Mass. — McCormack & Dodge Corp. sought to graft two emerging technologies onto its product line last week when it announced agreements to jointly market an expert system shell for mainframe applications and jointly develop an interface to an electronic document interchange (EDI) system.

M&D, a supplier of accounting, human resource and manufacturing applications, said it has teamed with Aion Corp. to develop and sell applications built with the Palo Alto, Calif., firm's expert system development environment, the Aion Development System.

M&D is licensed to include Aion's runtime product, the Aion Execution System, into its existing applications. The runtime product would enable M&D applications to issue a call to an inference engine, which can process rules embedded in the application.

A select few

Aion is one of a handful of companies that has provided expert system capabilities for production and data management environments under IBM's MVS and MVS/XA, including CICS, TSO and IMS/DC. Aion products also run under IBM's VM/CMS and on IBM Personal Computers.

M&D already has a project under way that uses the Aion technology to develop internal applications to help M&D technicians provide customer support.

The company also wants to add expertise to some of its mainframe applications. Last year, the firm launched two in a series of personal computer applications that work in conjunction with its mainframe software. Vice-President Rob Kelley said the firm will offer PC-based expert systems as well.

M&D also signed an agreement with GE Information Services in Rockville, Md., to develop interfaces between M&D applications and GE's EDI system.

The pact would allow M&D customers to exchange purchase orders, letters of credit, shipping notices and other business documents by invoking standard electronic formats.

The system makes use of GE's minicomputer and mainframe network, which reaches 750 cities worldwide.

M&D spokesmen said the EDI interface will be incorporated into the next release of M&D's Purchase Order/Millennium package, due out this year.

Embedding the expert system technology is still in the research and development stage, and no time frame has yet been released for when that will become available.

Chip sets to clone PS/2 functions

BY ED SCANNELL
CW STAFF

MILPITAS, Calif. — Chips and Technologies, Inc. is expected to announce chip sets next week in New York that will allow computer manufacturers to produce systems compatible with IBM's Micro Channel-based Personal System/2 machines, according to sources close to the company.

Chips and Technologies will use a series of BIOS products created by Phoenix Technologies Ltd. The chip sets, combined with the Phoenix products, will allow personal computer makers to deliver Micro Channel-compatible products by mid-year, one source said.

Last month, Phoenix signed a joint development agreement with Western Digital Corp. to create a series of read-only memory BIOS products that, when used with Western Digital's chip sets announced in October, will let manufacturers build Micro Channel-based systems.

While he declined to disclose details of the announcement, Raj Jaswa, Chips and Technologies' senior product marketing engineer, said the company promised late last summer to announce Micro Channel-compatible products this month.

"I think the marketplace is beginning to anticipate some sort of product announcement from Chips. We said [in August] that we would be introducing some PS/2 Micro Channel products in the January time frame," Jaswa said.

What next?

With the necessary tools now available to create a Micro Channel clone, the next question is who will be the first OEM to deliver a system that tests the tough legal stance IBM has taken on defending its proprietary technology.

The technical issues connected with cloning the Micro Channel have been more demanding than the legal ones, Jaswa said. He added that he does not anticipate any legal challenge to emerge from IBM over his company's forthcoming chip sets.

"Our approach has always been toward logical extraction, because it is a time-proven, legal way of reverse engineering. As long as there is no micro code in any device, the legality of reverse engineering has never been questioned," he said.

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Pansophic courts end users in versions of Easytrieve Plus

BY JEAN S. BOZMAN
CW STAFF

OAK BROOK, Ill. — Pansophic Systems, Inc. will announce two variations on its Easytrieve Plus query and report-writing package this week — both designed for end users who have little or no programming experience.

The packages, a mainframe product called EZ/IQ and a personal computer-based product called Easytrieve Plus-Natural Language (NL), have been in beta-test sites since last fall. Early users say both user-friendly Pansophic packages could help make a dent in the backlog existing in applications development at IBM shops running MVS, VM and DOS/VSE. The initial marketing effort is aimed at Pansophic's customer base of 15,000 sites worldwide, 6,000 of which already possess Easytrieve Plus.

EZ/IQ allows a data base administrator to preselect mainframe data from IBM VSAM files and to make the selected data available to end users for query from IBM 3270 terminals. The program then guides end users through prompts and menus in selecting data subsets for inclusion in on-screen reports.

Interface in the works

An extract facility allows conversion to the PC-based formats of Lotus Development Corp.'s 1-2-3 or Ashton-Tate Corp.'s Dbase for later manipulation on an end user's personal computer. Initially, EZ/IQ will run against VSAM only, according to Joan Fee, marketing product manager for Pansophic's Productivity Products division, but an interface to IBM's DB2 is planned for release this fall. EZ/IQ costs between $24,000 and $40,000, depending on CPU configuration.

One early user, Seven Oaks International, Inc., an El Paso, Texas, processor of supermarket coupons, plans to use EZ/IQ to reduce an applications backlog. "EZ/IQ is leaps and bounds ahead of Easytrieve Plus in terms of what you have to do to prepare a query," said Enrique Torres, director of information services at Seven Oaks. "After six hours of on-site training, our end users had learned to navigate the different data types. Our experience with EZ/IQ and with Easytrieve Plus-NL since October has convinced us to install them as productivity tools to help us catch up with an estimated 14,000 hours of work in coding applications."

Pansophic's new PC-based package, Easytrieve Plus-NL, priced at $499, gives end users the chance to pose data base queries in their own words, Fee said. The natural-language interface, developed by Elliot Bay Computing, Inc., a Seattle-based artificial intelligence concern, converts the English language questions into Easytrieve Plus code to be run on an IBM mainframe. The end user can also "teach" the program new vocabulary words, Fee said.

> "EZ/IQ IS LEAPS and bounds ahead of Easytrieve Plus in terms of what you have to do to prepare a query."
>
> ENRIQUE TORRES
> SEVEN OAKS INTERNATIONAL, INC.

"We decided that Pansophic had successfully addressed the report-writing market but that it had missed the potential market for end users who lacked programming experience," Fee said. "Our philosophy with these new products is to provide an open architecture that will allow people throughout a company to access mainframe data." However, Fee cautioned, security is built into both new products so that casual inquiries by unauthorized people cannot be made against the corporate data base.

Paccar, Inc., a Seattle-based manufacturing firm that makes Peterbilt and Kenworth trucks, has been using Easytrieve Plus-NL since last fall. At Paccar, on-line inquiries run all day, while batch queries are run from 6 p.m. to 4 a.m. In the past, that practice has forced end users to wait for programmers to help them create new queries for the mainframe.

"Using Easytrieve Plus-NL, as we have for several months, end users can use natural-language questions to generate their own coded queries," said Margue Hunt, a systems analyst at Paccar. "Later, we check these queries for syntax, compile the queries and run them overnight. That way, the end user has his data when he comes into work the next morning."

For example, Hunt said, an end user can type in, "Is there anybody in the data base named Jones?" and get the response "Yes!" Then, by typing in "Who?" or "In which city?" or "What's his phone number?" the system will deliver the person's personnel description, address or phone number. Underlying the English language queries is a checker that prompts when the questioner's meaning is unclear.

Congress shifts security power to NBS

Reagan expected to sign act stripping NSA of civilian encryption responsibility

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — In the last few hours of its 1987 session, the U.S. Senate gave final approval to legislation that gives the National Bureau of Standards (NBS) the lead role in setting standards for data encryption, access controls and other security measures in the civilian sector.

The Computer Security Act of 1987, which reportedly will be signed into law by President Reagan shortly, is Congress's effort to strip that power away from the National Security Agency (NSA), an intelligence unit of the U.S. Department of Defense.

Supporters said the legislation will restore civilian control over security programs for civilian information systems. The NBS is part of the U.S. Department of Commerce.

THE ACT specifically requires the NBS to establish security standards and training programs for federal agencies using unclassified information systems.

More than three years ago — under a controversial presidential order called National Security Decision Directive 145 (NSDD 145) — the NSA got authority over both civilian and military computer security policies.

"The central purpose of this legislation is to reject the federal computer security plan set forth in NSDD 145," Sen. Patrick J. Leahy (D-Vt.) said.

Big Brother watching?

Critics in Congress, the Information Industry Association and civil liberties groups viewed NSDD 145 as a step toward military regulation of government information systems and commercial online data services [CW, July 8, 1985]. Leahy said that while the bill is intended to strengthen the security of government information systems, nothing in the bill is meant to restrict the free flow of unclassified government information, such as disclosures made under the Freedom of Information Act.

Data security officers at the nation's commercial banks supported Congress's decision to put the NBS, rather than the NSA, in charge of security standards for the civilian agencies and the private sector. The American Bankers Association has had running battles with the NSA because the intelligence agency wants to replace the Data Encryption Standard, which is widely used in the banking industry [CW, March 23, 1987].

"The decision to put computer security in the hands of the NBS gives banks a signal to continue work on improvements in EFT [electronic funds transfer] security and privacy protection of computer data," said Eddie L. Zeitler, a member of the banking association's data security committee and vice-president of Security Pacific National Bank in Los Angeles.

The Computer Security Act specifically requires the NBS to establish security standards and training programs for federal agencies using unclassified information systems, while security for classified systems is left to the NSA. In addition, a 12-member advisory board will be established to provide advice from the private sector.

In a move that helped gain the Reagan administration's support for the bill, legislators agreed to language stating that the NBS should draw on the technical expertise of the NSA's National Computer Security Center, where appropriate.

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The legislation was originally sponsored by Reps. Dan Glickman (D-Kan.) and Jack Brooks (D-Texas), who guided it to passage by the House of Representatives last June [CW, June 29, 1987].

Computer vendors, including the Computer and Business Equipment Manufacturers Association, had expressed concern that the legislation might create two incompatible sets of security standards, one for the civilian sector and one for defense and intelligence agencies. In statements published in the Congressional Record, senators said they expect the NBS and the NSA to cooperate and produce complementary standards.

"I have been assured by the NBS that once a system has passed muster at the NSA's computer security center, it would not have to go through the NBS process for use by agencies with unclassified systems," reported Sen. William V. Roth (R-Del.).

Leahy said the legislation actually "provides a framework for reconciling the sometimes differing security needs of these distinct communities."

Tape drive for Unisys 1100 unveiled

BY JAMES CONNOLLY
CW STAFF

BLUE BELL, Pa. — Unisys Corp. has taken the first step in executing its plan to offer peripherals that are compatible with both its mainframe lines by introducing an IBM 3480-type cartridge tape subsystem.

Unisys last week announced the 5073/0899 subsystem and said it was shipped to 15 customers in the U.S., Europe and Japan last month. It is initially available for the Unisys 1100 series.

The Unisys debut comes more than three years after IBM announced the 3480 as the first mainframe-class cartridge drive in 1984.

Technology holdups

Unisys corporate program manager Fred Hanhauser said the delay in developing a Unisys answer to the 3480 was due to the learning curve that OEM suppliers went through in matching IBM's specifications because of the amount of new technology in the thin-film-head 3480. He said the Unisys subsystem is manufactured by Fujitsu Ltd.

However, Hanhauser said that Unisys expects to take the initiative, rather than reacting to IBM, in developing future enhancements for the 5073/0899. He said be also expects the 5073/0899 to be accepted by Unisys customers more quickly than the 3480 was accepted by IBM customers because most large computer users are now familiar with the 3480 technology.

The 5073/0899 is available for use with all models of the 1100 series, from the 1100/60 through the 1100/90. Hanhauser said it will be available for use with Unisys A and V series CPUs during the second half of this year and that an automatic loading feature will be available by the end of the year. He said it will not be compatible with the older Unisys B series.

Hanhauser said the Unisys subsystem is functionally equivalent to the 3480 with a density of 37,871 bit/in., six times the density of older reel-to-reel drives.

The 5073/0899 is available in configurations with up to 16 host connections and 16 drives with dual controllers. A minimum subsystem, which includes a control unit and a dual drive, costs $108,550.

IBM Cobol 85 draft ready

BY CHARLES BABCOCK
CW STAFF

The National Bureau of Standards (NBS) has completed its draft of a report on its test of an IBM Cobol 85 compiler and submitted the report to IBM for comment, according to NBS programming language adviser Mabel V. Vickers.

IBM planned to offer its response on the test of its mainframe Cobol 85 compiler by the end of last week.

The draft report was sent to IBM for comment as part of a standard bureau procedure that gives the vendor an opportunity to review the report before publication.

While no publication date has been set, both an IBM spokesman and a representative of the bureau said they expect the results of the test to be available by the end of this month.

"The NBS will have a response from IBM by today to allow the findings to be published by the end of January," said John H. Mihalec, a spokesman for IBM corporate headquarters in Armonk, N.Y.

Although IBM has not publicly announced a mainframe Cobol 85 compiler, the software is believed to be included in its next version of its VS Cobol II.

IBM requested a private test of the compiler by the NBS in early November. The nondisclosure route is a rarely invoked option under NBS procedures, bureau spokesmen said. The test was disclosed in a Nov. 30, 1987, *Computerworld* story.

OS/2 team

FROM PAGE 1

with the Intel Corp. 80386 microprocessor or third-party video adapters and displays that IBM does not offer, the two firms explained.

Despite the minor differences, both companies emphasized compatibility. "Any program written for OS/2 will run on OS/2, whether it's from IBM or any other vendor," noted Adrian King, Microsoft's director of product marketing for operating systems software.

Industry analysts last week called the exercise a move to limit fragmentation of the embryonic OS/2 market. For OS/2 to become a success — like its predecessor, MS-DOS — Microsoft has to convince the computing community at large that applications will run on a variety of micros independent of the hardware configuration.

"There'a been a fair amount of confusion surrounding OS/2 up until now, so both companies want to show how close each version of OS/2 is," noted Ruthann Quindlen, vice-president of New York-based investment firm Alex Brown & Sons.

By pointing out the minor differences, the companies are attempting to prevent confusion like that which ensued with the debut of IBM's PC-DOS, a derivative of MS-DOS. Early versions of PC-DOS contained fivaor six utilities that were not offered with MS-DOS, King recalled. As a result, some early programs written for MS-DOS would not run on PC-DOS.

OS/2 was developed as a flexible operating system to be customized by micro vendors to fit their specific hardware configurations and market requirements, King said.

Program code differences in the two versions include the text string, which in IBM'a OS/2 reads as "IBM" and in MS OS/2 is displayed as "Microsoft" or "MS." The default shell of each release is identical, although both companies developed different program selectors that are functionally equivalent.

Implementation options

MS OS/2 has optional features that a micro vendor may choose to incorporate into its implementation of the operating system, including a dual-boot facility; alternative mechanisms for switching the processor between real and protected modes; a disk drive with cache; and a disk driver and FDISK command that recognize other disk partition schemes.

Microsoft is providing an installation program with its OEM product that is similar to MS Windows, although micro vendors may choose to modify it or write their own, King said.

IBM chose to write its own installation program. The result is that different micro vendors' implementations will likely have different file layouts and installed sizes and consume different amount of memory, the firms explained.

Britton, Lee resign amid loss, layoffs

LOS GATOS, Calif. — Britton Lee, Inc. cofounders David L. Britton and Geoffrey M. Lee have both resigned from the company, which last week announced a steep fourth-quarter loss and plans to lay off 20% of its work force.

The departures of Britton and Lee, effective Jan. 1, leave full control in the hands of President and Chief Executive Officer John C. Cavalier.

Cavalier joined Britton Lee last year after leaving the top post at NCA Corp. when that firm was acquired by Ask Computer Systems, Inc.

Britton Lee experienced a major slowdown in sales of its data base machines in 1987. The 10-year-old firm said it will report a loss of approximately $9 million for the year on revenue of about $25 million.

A fourth-quarter loss of $2.5 million to $2.9 million will include provisions for the layoffs of approximately 50 of Britton Lee'a 280 employees.

EDITORIAL

Into the future

Just when you thought the world had all the computing power modern civilization needed — with some futurists calling for a world of tomorrow in which personal computers have replaced mainframes, minicomputers, toaster ovens and stereos — comes a series of announcements that give a slightly different view of the computer world.

Consider the following:

- In March, two aggressive upstarts, Stellar Computer and Ardent Computer, say they'll bring to market machines that pack 20 million instructions per second or more on a desk top.
- IBM has lured supercomputer wizard Steve Chen into its camp with a partnership to launch a more vital and concerted thrust into the budding supercomputer market — a thrust possibly aimed at mainstream commercial markets.
- Sun Microsystems is gambling that it can create its own standard in microprocessor technology with its proprietary reduced instruction set computer architecture, designed to create more workstation and minicomputer systems. Last week, a plan was unveiled that will see AT&T — somewhat of a slumbering giant in the computer field up to this point — take an equity investment of up to 20% in Sun.

Somehow, vendors are convinced that users have an insatiable desire for raw computing power, even if the software to take advantage of that power lags the hardware by years. Up to this point, no one has proven vendors wrong.

However, manufacturers, hospitals, trucking firms and others are moving to catch up to the potential of fully computerized systems. Fortune 500 firms are moving beyond the enterprise computing concept of linking departments and subsidiaries and toward the "extra-enterprise" concept of electronically linking internal systems to suppliers, partners and customers. Decreasing prices of computer systems are making it affordable for smaller companies to join in.

In many respects, the purchasers of computing equipment are in the driver's seat. If today's equipment lacks the required horsepower, purchasers can be assured that tomorrow will bring something more adequate; if the price isn't quite right, wait six months and see how quickly vendors move to maintain a low-cost edge.

The biggest challenge for businesses acquiring computing power lies in sculpting long-term systems acquisition strategies in the face of a never-ending series of technological advances. Overly cautious companies risk losing pace with more innovative competitors, while those that are too eager should worry about being saddled with suddenly expensive invoices as equipment prices erode and suppliers who overreach their potential have to fold or sell out.

Lasting success will come to computer buyers who are on the leading edge but not on the "bleeding edge." A long-term strategy with solid goals, accompanied by a series of flexible acquisition plans, will enable firms to stay on top of technology and be insulated from the inevitable failures of the industry's breakneck pace.

LETTERS TO THE EDITOR

Feels left out

The article "Netview revue steals TCA show" [CW, Oct. 5, 1987] failed to mention that General Datacomm, Inc. also successfully demonstrated the ability to operate with IBM's Netview/PC.

The omission was all the more remarkable given that some vendors were cited that failed to demonstrate the capability but merely claimed compatibility in future offerings.

Daniel L. Young
Vice-President of Marketing
General Datacomm, Inc.
Middlebury, Conn.

Missed the point

In the article "CASE on cure-all" [CW, Nov. 23, 1987], William Inmon made a good point when he stated that computer-aided software engineering (CASE) is a tool but is also the solution with respect to software development.

However, Inmon forgot his own wisdom and proceeded to imply that methodologies are the solution. Any methodology is a tool, just as CASE, fourth-generation languages and others are tools. Implementation of a methodology in software development is no guarantee of success, instant or otherwise.

Indeed, adoption of any tool only means that it has been added to the toolbox. The value of a tool is derived from its proper use. Lack of use, or improper use, can cause more problems than not having the tool at all.

Although adoption of CASE may not be the answer to lack of productivity in a particular organization, adoption of a methodology — whether or not CASE is involved — may not be the answer either.

Note, too, that acquisition of a tool, followed by lack of use or misuse of that tool in an effort to correct for lack of success with another tool, can compound rather than solve the problem.

Thus, an organization that is using CASE and not gaining desired results determines that a methodology is required. After acquiring the methodology, the firm may still not obtain the desired results from the combined use of the methodology and CASE if the tools are not used properly both individually and in combination.

Many factors are involved in a successful MIS installation. These include effective, open-minded management and a team of dedicated professional programmers and analysts. These must then be provided with the tools necessary to do the job and with the leadership and atmosphere in which to do that job correctly.

In an atmosphere where quality and effectiveness are stressed, where the needed tools and training are available, success of the staff and organization is more likely than in an environment where tools are thrown at problems with the idea that they will be the solution.

David Ray Fuller
Information System Manager
Northview Corp.
San Diego

The answer is . . .

I want to respond to a Spotlight on large and medium-scale systems [CW, Sept. 21, 1987] and one on Unix hardware [CW, Oct. 26, 1987].

Pyramid Technology Corp.'s Series 9000 data relative to maximum and typical number of users supported differed in both articles. Regarding the maximum and typical number of users supported, this is largely dependent on specific user applications. Any computer system with wide- or local-area networking facilities can literally connect thousands of users. The level of performance desired by a user for a specific application dictates the typical or maximum user configuration.

Nick Tuttle
Vice-President of Marketing
Pyramid Technology Corp.
Mountain View, Calif.

This week in history

Jan. 9, 1978
Six senators, adding to a growing chorus of complaints, ask the Office of Management and Budget to defer funding for the Tax Administration System, a controversial computer system proposed by the Internal Revenue Service.

Jan. 10, 1983
Charges for dial-up communications services will be drastically altered in 1984 when the Federal Communications Commission imposes a new method of collecting service fees.

Computerworld welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor, Computerworld, P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.

Getting together with software in '88

AMY WOHL

Remember diskette roulette? If you used five software programs, you had five diskettes. When you wanted to change from data basing to word processing, you did the following:

- Closed the file you were currently using;
- Closed the program;
- Spit the program diskette out of your personal computer;
- Inserted a different program diskette;
- Loaded the program;
- Opened the new program;
- Created or opened a file.

This procedure proved you were a logical, sequential thinker and entitled to use your own PC.

The advent of hard-disk machines eliminated the worst parts of diskette roulette. We still have to load each new program and its inevitable upgrades, but most of the time, we can cruise the DOS directory system, moving freely from program to program and file to file.

Users want more

Users have vociferously proclaimed that this level of integration — all of the necessary software accessible within the same computer — is not enough. What users want is to combine data as well as programs to support the arrangement and rearrangement of their information.

Software vendors try to help by making their programs access, and accessible to, other popular packages. But this access requires an enormous amount of extra work, to say nothing of the productivity lost to the thought processes interrupted by computer administrivia and the need to remember five arcane sets of totally different commands, never mind managing keyboard templates.

Early integrated packages, such as Lotus's 1-2-3, Symphony and Framework, tried to let you get at multiple activities without changing packages. They also included some consis-

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Wohl is president of Wohl Associates in Bala Cynwyd, Pa., and editor of "The Wohl Report on End-User Computing" newsletter.

The perfect scapegoat for a multitude of sins

AMY SOMMERFELD FIORE

"I couldn't get the report done for this morning. We had a blackout last night."

"Sorry I was late, but, you know — traffic."

"I couldn't fix your computer yesterday. It's a software problem."

Heard it before? Mysterious forces that are clearly beyond our control make the best scapegoats — enigmas like traffic, weather and, best of all, software. If you broaden "software" to mean everything about a computer you can't actually see or touch, then you have a prime target indeed. If the failing machine is not wet, broken or unplugged, then it must be a software problem.

Maintenance personnel have suffered this credibility problem for years. Co-workers even invented jokes in their honor. (How many hardware engineers does it take to change a light bulb? None, it's a software problem.)

Software has big shoes to fill. Professor David Parnas of Queens University in Kingston, Ontario, says, "The reason software is so hard is that we design all the easy jobs into the hardware." Any really predictable, repeatable task is generally hard-wired or coded into chips or boards as firmware. The really difficult, tricky, changeable conditions fall to software to interpret.

Futures trading, medical diagnosis, credit approval, hurricane forecasting, missile guidance — can you see trusting any of these to the sole discretion of a silicon-filled box? Spaghetti or no spaghetti, it's better to turn to a few million lines of Cobol code. That way you can stick in those last few conditions you forgot or update it with the new tax code.

Malleable software may look foolish — those last few conditions tacked on the end hardly seem elegant to an engineer. But it can cover a multitude of hardware design errors, project constraints, management idiosyncracies and the other sundry sins of everything that isn't software.

Fiore is a *Computerworld* senior editor.

Only you can prevent an MIS shortage

Ranks of computer college grads are thinning as students lose interest

FREDERIC WITHINGTON

There is going to be a severe shortage of college graduates coming into the computer field at the entry level, and only you can alleviate it.

According to a Michigan State University study, the academic majors most in demand today are computer science graduates. Employers want to hire more of them than graduates of any other technical field.

Demand is likely to continue, or even intensify, because the central ranks of MIS departments are being depleted. Many of the first generation are reaching retirement age, and many of the younger specialists have been lost to information centers and user departments during recent decentralizations.

A University of California study of college freshmen's preferences shows that only 1.9% of them plan to major in computer science, down from a high of 4.5% in 1983. Those planning careers as computer programmers or analysts number 3.5% of the total, down from 8.8% in 1983. No other technical field has suffered such a decline in interest.

Worse yet, these percentages apply to a declining number of college freshmen because of the drop in the overall population of the age group. Clearly, there is going to be a significant mismatch between supply and demand for entry-level technical people.

Shortages will be even more severe for certain specialties. MIS departments will want to hire network managers and data base administrators as well as experts in departmental, manufacturing and desktop publishing systems. Many colleges are, for the most part, training compiler writers and Cobol programmers. This dichotomy between what is taught and what is needed may be one reason for the decline in interest.

The natural tendency is to knock the educational establishment for doing a bad job. This blame may be justifiably placed, but it is not much help. Colleges can't force freshmen into unwanted fields of study, especially since there is already intense competition for the dwindling supply of students. It also takes time to change the curriculum. Incumbent faculty members aren't qualified in the hot new areas, and the tenure system prevents replacing them.

Help from the field

Only you — managers and senior technicians who currently inhabit MIS organizations — can help. Only you can motivate students and correct their misconceptions about the field. Only you can share experience in the latest techniques and technologies with faculty members. Managers can show students the attractive employment opportunities that await them in MIS. Managers can provide cross-fertilization between their companies and colleges. Senior technicians can share their hard-won knowledge with both students and faculty. What follow are some specific suggestions.

CHRISTOPHER BING

Most high schools run career days for seniors. These programs offer a good chance to influence students before they make college commitments. Send an experienced manager to talk to the students. Better yet, offer a tour of your facilities. The more students have a chance to meet your staff, the better. They will realize that not all computer people are the hackers depicted in the movies.

Offer help to the computer science and MIS faculties at local colleges and universities. A manager can try to arrange a donation of money, equipment or facilities from his employer. Sometimes this contribution provides a welcome tax deduction and a good way of disposing of equipment no longer useful to the organization but of interest to a college.

A manager can arrange to provide guest lectures. These gifts of time can be as welcome as money if the talks are on hot topics that the faculty can't handle, such as network management. Often, members of the MIS staff are good teachers and welcome the chance to organize their own knowledge, which lecturing provides.

The manager can arrange part-time employment for faculty or staff. Such employment would usually be for summers or sabbatical years and could be designed so the faculty member learns useful knowledge and also contributes to the organization.

Student employment could be anything available — part-time data entry and night machine operator jobs look better than waiting tables. And valuable interaction between you and the student occurs. A job upon graduation is a natural consequence.

Your own staff members should be encouraged to volunteer to lecture, tutor or provide tours. Management's approval will usually be forthcoming and isn't even needed if the time commitment falls outside of working hours. Compensation (besides the satisfaction) will be the sharpening of the staff member's knowledge and interaction with others who have fresh viewpoints and may even include an honorarium.

It is easy to make contact. Even if no one knows anyone at the local school or college, a blind letter to the principal or president will usually produce a cordial response. Professional societies are also effective for making connections. All of them value the promotion of academic-industry cooperation, and academics usually attend their meetings. There are youth, fraternal and even church-related organizations that are relevant.

Opportunities abound. But from survey results, not enough MIS managers are taking advantage of them. It is in your company's self-interest to do more.

A 30-year veteran of the computer industry, Withington was a vice-president at Arthur D. Little, Inc. and is now an independent consultant. He has written four books and more than 60 articles and papers.

Together

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tency of interface and data files. But they were not really integrated at the function level.

The big software news for 1988 includes new levels of integration previously unavailable to computer users. This new integration will not ease the task of moving between related software applications — it will eliminate it. Gone will be the need to open and close tasks or move between separate windows that each run a different function. These new integrated products will easily support multiple activities that were previously available separately.

The first area expected to benefit from such integrated products will be a tricky one to name. The as-yet largely unannounced products typically include word processing, graphics editors and the type of format and layout capability that is currently called desktop publishing. Perhaps the products should be called "advanced word processing" or "next-generation word processors," but getting widespread agreement on any particular name is uncertain.

There are two major areas of emphasis that set 1988's integrated software products apart from their predecessors.

First, each product is a fully implemented, high-end tool that frequently offers functionality at a level that equals or exceeds the best dedicated product offering in that market today.

For example, the word processing component of these new packages is not just a simple text editor but a full-blown product, complete with floating footnotes and automatically generated tables of contents and indexes. The graphics editor will understand and utilize color and performance and might handle complex, algorithmically driven functions such as rotation and shading. The layout editor will be competitive with high-end products like Xerox's Ventura Publisher.

Second, the level of integration will be very high. This means the user won't have access to a graphics editor within the word processor; the graphics editor is within the word processor. So the user can maintain full context on the screen and see the effect of work in process in full or nearly full what-you-see-is-what-you-get form while using a different family of tools.

Expect 1988 to be full of advanced word processing announcements — even a few deliveries. For image-oriented applications, Apple's Macintosh will lead the parade, followed by products based on IBM's PCs.

But that's not all

But the integration of word processing, graphics and layout is not the only useful integration, nor is it the end of the process. Imagine a high-end data base with a full word processing function for editing long text fields and a graphics editor for creating graphics within the fields as well as the already available capability (in some quarters) to read graphics files in data base fields.

Or imagine a product that offers data base functionality on text — with little or no additional effort on the user's part — sort of a marriage between Wordperfect and Agenda with a little more formal data base functionality thrown in.

Also, assume that increasing levels of user expectation will now occur. Users will want more and more integration (just as they first demanded color, then rotation and then three dimensions from graphics developers). Eventually, users will go wild and demand that everything be integrated with everything, and integrated packages could get very large. Alternatively, someone will finally figure out how to let us integrate our chosen functions and packages within a single interface and file structure. Both families of software approaches — snapping into a common menu interface and separately marketed menu interfaces — would be possible here.

The power of the new generation of PCs could be used for bigger, faster spreadsheets. But we are certain, at least for some of us, that it will be used instead to allow user-selectable integration, to at last permit us to use computers to support our work, as we see that work.

SOFTWARE & SERVICES

SOFT TALK

Charles Babcock

The NBS's black veil

When the National Bureau of Standards (NBS) rewrites its rules on testing compilers, it should rule out nondisclosure agreements rather than clarify how vendors can go about requesting a private test.

The interpretation of bureau procedures that finds a nondisclosure provision available to those requesting it favors the vendors, while the certification process was set up to benefit users. The tests are used to establish the Certified Compiler List — a blue, 8½- by 11-in., paperbound volume. The list was initially published to aid purchasers in federal agencies but has since become a standard reference work in the industry.

Think of the benefits to users if more light were shed on the validation process. Granted, not every compiler vendor would want to acknowledge that it had rushed a compiler through development, had failed the certification test and had been forced to come back again. On the other hand, it might be useful to customers to have this information exposed to the light of day.

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Group computing fuels demand

Report predicts software revenues will more than double in five years

BY CHARLES BABCOCK
CW STAFF

MOUNTAIN VIEW, Calif. — Software products are the fastest growing segment of information services and will overtake processing and network services this year, a recent study found.

By 1992, software products will account for almost as much revenue as the entire information services market in 1986, a report from Input, a market research firm here, concluded.

Titled "Software Products Market 1987-1992," the report estimated the entire information services market at $54.6 billion at the end of 1986, with processing and network services contributing $20.9 billion and software products accounting for $19.9 billion. By 1992, software products are expected to account for $52.2 billion vs. $38.2 billion from processing and network services.

Software product revenues are growing at an annual average rate of 21%, compared with a 13% rate for processing services (primarily CPUs of all sizes) and

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Software to dominate marketplace

Software product revenues are growing faster than those for hardware, professional services or turnkey systems

INFORMATION PROVIDED BY INPUT
CW CHART

Keyfast plugs into VM/CMS

BY SUZANNE WEIXEL
CW STAFF

MAYWOOD, N.J. — H&M Systems Software, Inc. recently ported Keyfast, its on-line direct data entry program, to the IBM VM/CMS operating system. H&M also announced a version of Keyfast for IBM Personal Computers.

Keyfast is a batch-oriented menu-driven program that supports on-line data base validation. It was originally available for CICS environments and is currently installed at more than 2,000 sites, the vendor said.

The VM/CMS version is targeted toward IBM's 9370 computer systems. It is fully compatible with the CICS version, H&M spokesmen said.

The program features a user-oriented interpretive language, built-in edit and check routines and automatic duplication.

Capabilities include adding, inserting, updating, deleting and reactivating records without

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Inside

Beefed-up MVS, MVS/XA utilities support more functions without sacrificing operation

SUNNYVALE, Calif. — Boole & Babbage, Inc. recently released versions of its IBM MVS and MVS/XA utilities that it said will allow additional procedures to be implemented without bringing down the system.

Resolve Plus Version 2.0.1 for MVS/XA and Version 6.0.1 for MVS/SP are interactive tools for detecting, diagnosing and solving common operating system problems.

Each version includes four new features. The Linklist service allows a user to modify MVS's link list without bringing the system down and then perform an initial program load (IPL). The link list is a directory of program names that the operating system can search to find locations.

The Dview service lets users display any block of data on a storage device, and the Equate service reportedly simplifies the dump procedure by using a modified list of commands.

Finally, the Info service allows users to keep track of IPLs and other basic information on the operating system. The Equate feature is available for the MVS/XA version only; the other services are available on both versions of Resolve Plus.

The products are currently shipping. The MVS/XA version can be licensed for $24,000. The MVS/SP version carries a $19,000 license fee.

MSA shipping real-time module

BY ROSEMARY HAMILTON
CW STAFF

ATLANTA — Management Science America, Inc. (MSA) recently began shipping a real-time version of the employee position control module for its Payroll/Personnel System.

The module was designed to work with data in the Payroll/Personnel System, such as the employee master file, and, by doing so, to help users manage employee activity. The software runs under the IBM MVS operating system.

With the module, a human resource manager can be alerted to a job opening and then search the employee master file for staff members with the necessary qualifications, MSA said. The module also automatically updates an employee's job status and related data that would affect his new position. Within an industrial setting, for example, a promotion from the factory floor to a managerial slot could result in a change from hourly pay to a weekly salary..

One user reported that the module is a major improvement over the batch-oriented version MSA has been offering. William Hiers, employee relations manager at the St. Johns River Power Park, an electricity generating site for Jacksonville, Fla., said the real-time module has cut the time he spends on the system from 20 hours a week to two.

Additionally, Hiers said, the new module is more tightly integrated with the Payroll/Personnel System, allowing him to more easily access information.

MSA said the module can be licensed for $17,000 to $35,000.

Demand

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18% for professional services. Turnkey systems are projected to average 11% annual growth through 1992.

The report divided the software market into two segments: one for microcomputers and one for both minis and mainframes. The latter is growing "at a respectable 20%," or above average for information services as a whole, the report said.

"Based on the dramatic growth of mini and departmental systems and the observed slowdown in large mainframe shipments, there is no doubt the majority of the growth is occurring in the mini-portion of the segment," the report added.

The microcomputer segment renewed its explosive growth in mid-1986 after having slowed down during the first and second quarters; it is expected to average a growth rate of 25% per year through 1992.

When viewed across both market hardware segments but divided along systems and application lines, systems products are growing at a rapid pace. Systems control products are growing at a rate of 29%, followed by data center management tools at 23% and application development tools at 22%, Input said.

Keyfast

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rekeying existing information, retrieving data from files and tables or inserting computing values into entry fields.

The personal computer software package is a lookalike of the CICS system, the spokesmen said.

Data keyed on the PC is automatically transferred into the CICS counterpart, where the data can he maintained and processed on the mainframe.

Additional features of Keyfast include multiformat and multirecord screens, direct updating of user files, a data dictionary and the ability to write user exits in assembler, Cobol and PL/I. Help screens and messages are standard.

Keyfast is priced from $10,000 to $30,000. All three versions are available now, the vendor said.

Babcock

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Nevertheless, bureau thinking on this point is reflected in a comment from Helen Wood, deputy director of the Institute for Computer Sciences and Technology, the testing agency. Wood said, "We are trying not to penalize vendors for bringing forth a product that may not pass the test. Under our procedure, they're given a chance to find out if the product is really bad and clean it up without tarnishing their reputation."

The need to rewrite the bureau rules surfaced when it became clear that IBM had a mainframe Cobol compiler tested by the NBS but had not appeared on the bureau's Certified Compiler List as having a validated compiler or having been scheduled for a test of one.

IBM challenged a Nov. 30 *Computerworld* story that depicted the company requesting and getting a mainframe compiler tested by the bureau without public disclosure. Officials at IBM were angered by what they contended was the appearance that IBM was getting special treatment.

Other vendors were extended the same treatment, IBM asserted. IBM, however, was the only vendor to request a private test since the institute took over certification responsibility from the GSA more than a year ago, according to Wood.

IBM spokesman John Mihalec, on the other hand, suggested that querying vendors of mid-range processors would reveal a compiler producer that had previously used the nondisclosure procedure.

Checks with Hewlett-Packard, Prime, DEC, Wang and Honeywell failed to turn up anyone who could remember requesting an undisclosed test, and Wood doesn't recall such a vendor.

DEC's recently announced VAX Cobol compiler did not appear on the list of approved compilers or products about to be tested, but it was tested the week of Sept. 21, just prior to the Oct. 1 publication of the list. As a tested product, it wouldn't appear in the schedule of tests.

On Dec. 21, when *Computerworld* went to press with its second story on the testing process, Michael McCandless at Micro Focus said he thought his company had requested nondisclosure. In fact, while Micro Focus is one of the few vendors to discuss nondisclosure with the Institute, it never requested that approach, he said in a follow-up call.

IBM officials cited a need to avoid preannouncing their firm's mainframe compiler via an airing in an NBS publication as its reason for asking for nondisclosure. Granted, IBM, with a history of antitrust proceedings, has different legal concerns than other vendors, but Prime spokesman Warren Jacobs aptly points out that the announcement of a product test does not automatically constitute a statement of availability, pricing or even whether it will pass the test. Prime's compiler was an unannounced product at the time it was tested in public.

Have it your way

Indeed, while using a concern about preannouncement as a cloak in this case, IBM has been informing its largest customers of the compiler's existence for nearly four months. As Mihalec says, "While there has been no public announcement, this Programming Request for Price Quotation has been listed since September in an internal data base for IBM branch offices as being available to meet specific customers' needs."

The main drawback of the current procedure is that a vendor can withdraw from a test before it is completed, allowing it to remain behind the cloak of secrecy if it is on the brink of failure. With no completed test, there are no test results and, under current rules, which the bureau wishes to make stronger, the vendor may opt for a test that will not be made public until full results are available.

Why not put this testing process back in the public arena, where it started out in the first place?

Babcock is *Computerworld*'s senior editor, software & services.

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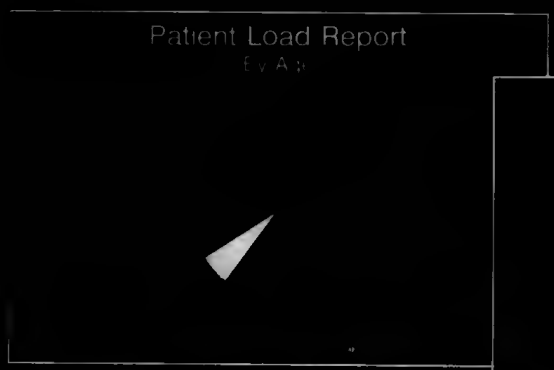

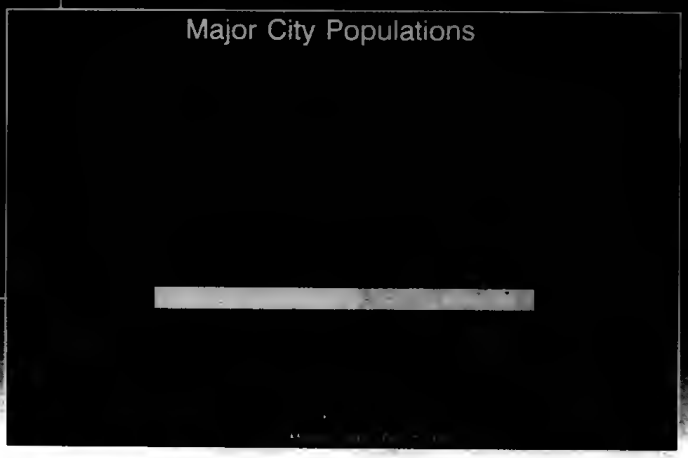

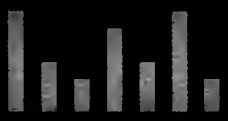

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NEW PRODUCTS

Systems software

A software product said to simulate batch and semicontinuous processes in the biochemical, pharmaceutical, specialty chemical and food industries has been announced by **Batch Process Technologies, Inc.**

Called **Batches**, the software allows users to model the start-up, execution and shutdown of multiproduct and multipurpose processes. The processing steps are modeled as a network of tasks, each with a sequence of subtasks, the vendor said.

Batches tracks the use of resources and other variables, then generates a summary report for each simulation.

Batches is priced from $25,000 to $45,000.

Batch Process Technologies, P.O. Box 2001, 1291E Cumberland Ave., West Lafayette, Ind. 47906. 317-463-6473.

Applications packages

An enhanced version of the **Organon Word Processor** for Digital Equipment Corp. VAX/VMS environments has been announced by **Orion Information Systems.**

Version 2.0 features a text editor with a spell-checker, a calendar scheduler and concurrent command execution between word processing tasks and VMS operations. Other features include a "what-you-see-is-what-you-get" display; use of overlaying rulers for text formatting; the choice of using a menu or a command mode; and the ability to layer operations indefinitely.

Organon costs $2,500 for the VAX and $1,500 for the Microvax.

Orion Information Systems, No. 260, 13741 Foothill Blvd., Sylmar, Calif. 818-364-1692.

Languages

Progress Software Corp. has ported **Progress**, its fourth-generation language and relational data base management system, to Convergent Technologies, Inc.'a CTOS and Unisys Corp.'a BTOS operating systems.

In addition to CTOS and BTOS, Progress runs on Digital Equipment Corp.'a VAX/VMS and Ultrix; Microsoft Corp.'s Xenix and MS-DOS; Unix; and local-area network systems.

Pricing for a full-application development copy of Progress for the CTOS/BTOS environment is $3,000 per cluster. It reportedly will be available in the spring.

Progress Software, 5 Oak Park, Bedford, Mass. 01730. 617-275-4500.

Utilities

Delta IMS Virtual Terminal, a product said to define an IBM IMS/VS network, has been announced by **BMC Software, Inc.**

According to the vendor, the software provides the ability to dynamically modify or add terminals, terminal security, data bases, programs, route codes and transaction codes to the IMS/VS network without risk of service interruption.

Other features include the ability to base storage needs on maximum concurrent demands rather than on maximum network size and enhanced security.

Delta IMS Virtual Terminal is available for IMS/VS 1.3, 2.1 and 2.2. It supports and enhances standard IMS/VS conversational processing, the vendor said.

A perpetual license ranges from $26,550 to $70,800.

BMC Software, P.O. Box 2002, Sugar Land, Texas 77487. 713-240-8800.

Training software

Innovative Software Solutions, Inc. has added **Using Edit/3000** to its Teachme/3000 computer-based training series for the Hewlett-Packard Co. 3000.

The module was designed to train users of HP's Edit/3000 text editor. It features Edit/3000 examples and is accompanied by a workbook of editing exercises. Module topics are grouped by function to be performed and are directly accessible through keyword commands.

The Using Edit/3000 module costs $750. It comes with the Teachme/3000 driver program in addition to an on-line tutorial.

Innovative Software Solutions, 10705 Colton St., Fairfax, Va. 22032. 703-273-5025.

Development tools

A development environment for creating custom data base applications has been announced by **Plexus Computers, Inc.**

The **Plexus XDP Applications Designer** runs under Microsoft Corp.'s Windows and allows users to develop applications for Plexus's Extended Data Processing System. Tools are included for entering, displaying, manipulating, storing and retrieving structured alphanumeric data and unstructured data in image and text format.

The Applications Designer includes a procedural language, and data base management is handled through SQL statements.

The system costs $2,950. A runtime license costs $595.

Plexus Computers, 3833 N. First St., San Jose, Calif. 95134. 408-943-9433.

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41. Engineering, Scientific, R&D, Tech. Mgr
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C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems
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558802-2

MICRO BITS

Ed Scannell

Making it official

Or maybe they'll continue to deny it. There are strong rumors circulating that Microsoft will, in the next week or two, formally announce its deal with Sybase to license its SQL data base. One source tells us Microsoft has decided to formally announce the agreement now because Lotus and IBM have already laid out their SQL plans as well as to take a little steam off the Ashton-Tate announcement this week.

The Taters are expected to announce a deal to license Interbase's data base server product, which also features a full SQL implementation. "Sybase is doing the back-end port, or server port, so they must be far enough along [in development] to be comfortable with making an announcement. Microsoft has to show its direction," one source tells us. Microsoft is expected to deliver the product possibly in this year's second quarter but "certainly no later than the third."

Lotus plays an encore. January will be a busy if not musical month for Lotus. This week,

Continued on page 32

Micro line claims Flex appeal

386-based systems emulate Compaq architecture but use proprietary bus

BY ALAN J. RYAN
CW STAFF

IRVINE, Calif. — Advanced Logic Research, Inc. (ALR) last week announced a series of Intel Corp. 80386-based systems that emulate the Flex architecture used in Compaq Computer Corp.'s Deskpro 386/20.

Called ALR Flexcache 386, the system is available in both 16- and 20-MHz floor-mount versions. They feature ALR's Advanced Cache Memory Dual-Bus Architecture, which is similar to the Compaq bus architecture, according to Dave Kirkey, vice-president of sales at ALR.

However, the ALR and the Compaq buses are not the same, according to Vic Sangveraphunsiri, manager of the enhanced systems group at ALR. "Our bus is proprietary to us. The only thing that is the same as Compaq's is the cache controller chip," he said.

Sangveraphunsiri said the ALR units have a faster memory. "We're using an 80-nsec dynamic RAM, and Compaq is using a 100-nsec dynamic RAM."

The ALR units, like the Deskpro 386, use the Intel 82385 cache memory controller with 32K bytes of 35-nsec high-speed static random-access memory.

The Flexcache memory controller can eliminate CPU wait states 95% of the time by keeping frequently used data close at hand and eliminatng the need for the CPU to address main memory, Kirkey said.

The flexible dual bus provides an open, high-speed data channel that allows up to 60% faster data throughput than the IBM Personal System/2 Model 80-071 with the Micro Channel architecture, ALR claimed.

The ALR computers feature s hard-disk controller that performs with a 1-to-1 interleave. The controller also includes full track buffering on its enhanced small device interface (ESDI) controller, increasing overall disk performance.

The company said it installed high-performance ESDI hard disk drives in 150M- and 300M-byte systems that have s disk-access time faster than 23 msec.

ALR designed the chassis of the 20-MHz models to accept up to two full-height hard disk drives and three half-height devices, which may include a 5¼-in. floppy, a 130M-byte tape

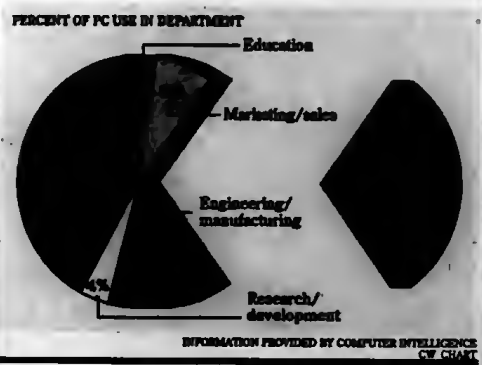
Continued on page 32

Inside

Data View

Number crunchers

Finance/accounting departments make most use of PCs in large corporations



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE
CW CHART

Slew of Mac products ship — from Claris

BY JULIE PITTA
CW STAFF

MOUNTAIN VIEW, Calif. — Claris Corp., Apple Computer, Inc.'s software subsidiary, last week launched its first products under its own logo, enhanced versions of existing Apple packages and two forms-creation programs.

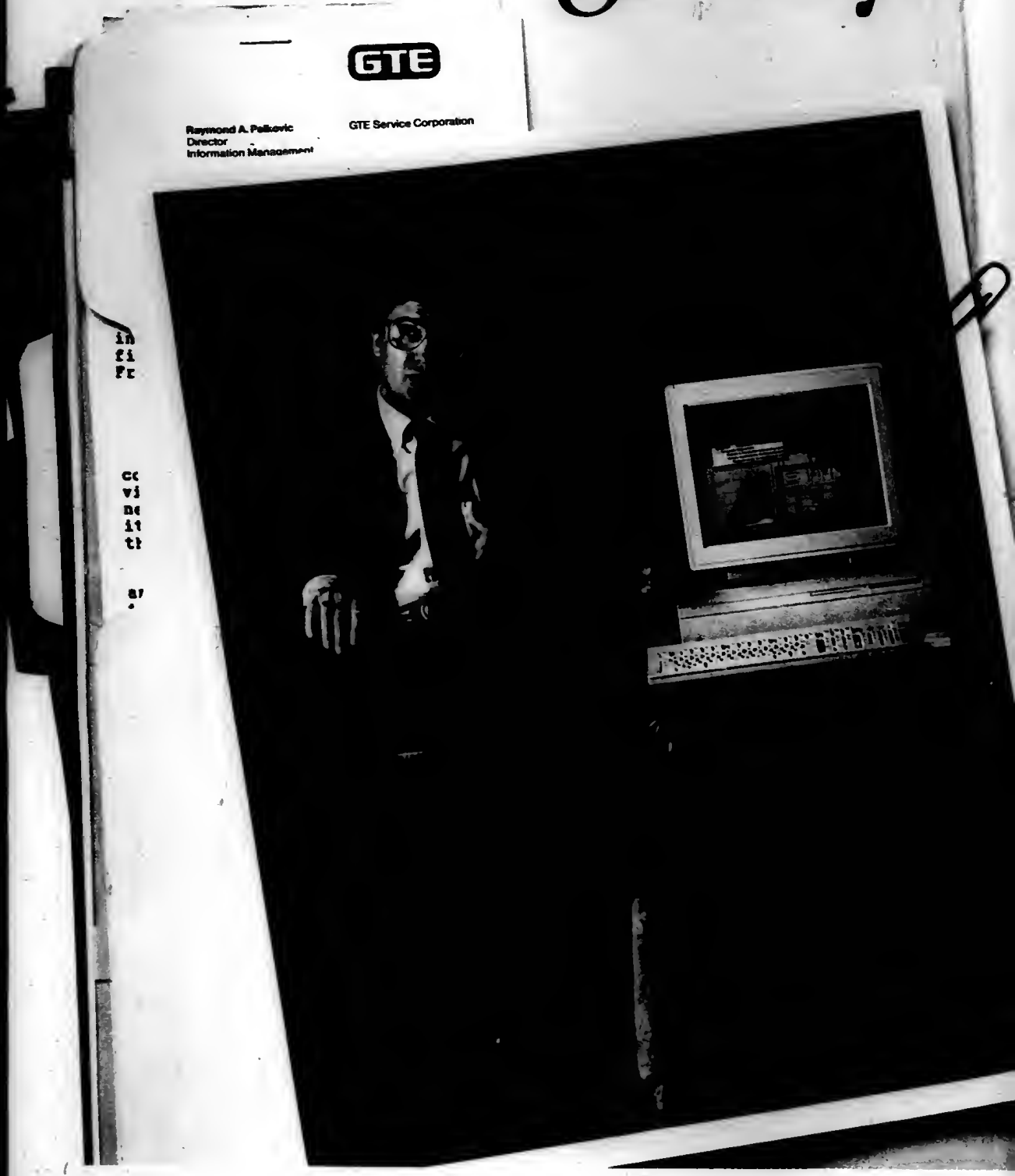
Claris unveiled upgraded versions of Macwrite, Macproject, Macpaint and Macdraw. Additionally, Claris introduced Smartform Designer and Smartform Manager, two applications software packages for the Apple Macintosh. An enhanced version of Appleworks — s software package for the Apple II also inherited by Claris — will be unveiled this spring.

Macwrite Release 5.0, which remains priced at $125, adds a spelling checker and large-screen support and takes advantage of the faster speeds offered by the Mac SE and the Mac II. Current Macwrite owners can obtain the upgrade by returning their original disk and paying an additional $25. Shipment to dealers begins this week.

Macproject II, priced at

Continued on page 32

MIS manager buys



Macintosh, keeps job.

Until very recently, the above headline was the MIS equivalent of "Man Bites Dog."

Because specifying Macintosh® personal computers for the corporate desktop was an act of sheer daring. Like hang gliding, or wearing a Mohawk.

But now, if the behavior of data processing executives is any indication, we've engineered the thrills out of handing us a purchase order.

Since the introduction of the Macintosh Plus with its 1 to 4 megabytes, and most recently the faster, expandable and MS-DOS compatible SE, hundreds of the *Fortune 500* have put Macintosh to work.

At first we were hired for specific jobs that no one else can do as well. Like low cost CAD/CAM and Desktop Publishing.

But then, our other merits revealed themselves.

Such as the open architecture of the SE and the new Macintosh II.

Which lets you connect seamlessly to DEC's VAX, IBM mainframes, and other popular systems. And by putting Macintosh at the front end, you give people a more civilized way to deal with mainframes.

Another revelation is the wide array of innovative Macintosh business applications–financial analysis, word processing, databases, and, of course, graphics. Which are not only easier to learn than what's running elsewhere, but more advanced.

The point-and-click simplicity of the Macintosh graphic interface is a well known boon for the user.

But it also turns out to be a major time and money saver for you who have to train all those users. Because Macintosh has a lower training cost per desktop than any MS-DOS computer on the market.

Macintosh's simple, straightforward operating style also pays off impressively after the training is over.

In an in-depth analysis of 7 Macintosh installations in business, users consistently reported productivity gains of 15 to 25% and more.

And on top of all this, Macintosh has excellent connections.

While others are pushing the "network of the Near Future," the Macintosh network is here and now. It's called AppleTalk.

AppleTalk is a networking protocol that is at the same time sophisticated, infinitely flexible, easy to set up. And meets ISO standards.

You can link the system together just about any way you want to–over phone lines, twisted pair, fiber optics or Ethernet.

Plug in a card and you can run AT&T UNIX™ as well as MS-DOS applications. And in fact, there are a variety of other ways to integrate Macintosh into the MS-DOS world.

Including the AppleShare™ file server which lets Macintosh and PC's link and share data.

All of which makes it a simple matter to incorporate Macintosh into any existing network.

Or, to build new ones.

We'd like an opportunity to demonstrate these and a catalogue of other innovations.

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SMALL TALK

William Zachmann

Keep an eye on Windows

The most significant impact of IBM's announcements of OS/2 and the Personal System/2 is that graphical user interfaces will become an integral part of IBM and compatible personal computers.

More important, IBM's adaptation of Microsoft Corp.'s Windows as the OS/2 Presentation Manager assures a standard foundation in the IBM-compatible world for graphics-based user interfaces. The nonproprietary character of the Windows Presentation Manager guarantees that it will be the de facto standard for DOS- and OS/2-based systems.

Microsoft Windows 2.0, which began shipping last month, is an essential element in the movement toward a practical user interface standard for users of IBM Personal Computers and compatible systems. Windows 2.0, priced at just $99, brings the exact look and feel of the Presentation Manager to the screen.

Practically speaking, Windows 2.0 requires at least a fast Intel Corp. 8086-based (preferably an Intel 80286-based and up) system with an IBM Enhanced Graphics Adapter (EGA) and monitor for satisfactory use. The program can run on an older IBM Color Graphics

Continued on page 33

Oracle treads into micro market, brings SQL to new class of users

Oracle Corp. made its mark selling SQL-based data base management systems that run on minicomputers and mainframes. The firm, which has pushed the notion of distributed data bases, is now pursuing microcomputer users with a full version of Oracle that runs on personal computers. Oracle's entrance into the PC market pits the firm against Ashton-Tate Corp., whose Dbase currently outstrips the sales of its competitors.

Oracle Chief Executive Officer Lawrence J. Ellison recently spoke with *Computerworld* Senior Editor Douglas Barney about the dynamics of the micro marketplace and bringing the power of SQL to a new class of users.

Ellison discusses *microcomputer data base technology.*

How do you see microcomputer data base technologies evolving?

I think microcomputer data base technology is evolving in lockstep with the way microcomputers are used. In the past, microcomputers were PCs. They weren't networked to other PCs, nor were they networked to departmental machines or corporate machines. I think that is changing a lot now.

A data base manager used to have to manage someone's personal data base, and that is very different as these machines get larger and get networked to minicomputers and mainframes. At that point, it's very important to have multiuser capabilities, distributed capabilities and recovery. It's very important to adhere to the SQL standard, because the SQL standard is available on mainframes, minicomputers and microcomputers.

With OS/2, which will become popular over the next two or three years, lots of other companies are going to have the opportunity to deliver serious DBMSs.

So it's been the lack of power of microcomputers that has held back microcomputer data bases until now?

Absolutely. There are two ways to look at it. The lack of size has prevented you from doing a large-scale data base on a microcomputer and also from doing networking with microcomputers among themselves, minicomputers and mainframes. It's not clear that you can use a large-scale data base on a microcomputer. It's an interesting situation. If you have a small standalone personal computer, it would be nice to have a large-scale data base on it. In one case, it's a luxury to have it on a standalone PC, but it's an absolute necessity to have it on a PC networked to other PCs and a mainframe.

Could you implement a full relational data base without SQL?

You could, but that's like asking, "Could you run Lotus on something other than MS-DOS?" Sure, you could do it, but no one is really interested in doing that because MS-DOS is now a standard, as is SQL.

When will we see an SQL standard that will allow a variety of SQL-based data bases to talk to each other? The ANSI standard is a bit watered down.

There are two levels in the ANSI standard: ANSI Level 1, which was an interesting compromise; and Level 2, which is the correct standard.

If you look at the ANSI Level 2 standard, you've got a pretty good standard that people will adhere to over time. But there are other things that aren't in the Level 1 standard, such as distributed capabilities. There are a bunch of things that are missing even from Level 2.

Some say porting is bad application to PCs isn't the best solution. How do you defend your approach?

MS-DOS has a silly restriction in it that says you can't direct more than 640K bytes. This made sense for old 8088 PCs, because the hardware couldn't address much. But 286 or 386 PCs, which are incredibly fast machines, can direct large amounts of memory. So we just bypassed the [640K-byte] restriction. Anything that runs under 640K was designed for a computer that is now five years old.

How long before the concept of distributed data bases reaches fruition?

I think distributed data bases are going to become very popular with products like Oracle for 1-2-3, in which the PC user can use his friendly interface and access data on minicomputers and mainframes. He's also going to

Continued on page 33

The raging battle between the spreadsheets

BY MORTON ROSENTHAL
SPECIAL TO CW

Information center managers have many things to worry about. But until recently, very little time was spent worrying about which spreadsheet to buy. Many other product categories require evaluation, but for spreadsheets, there has always been Old Faithful, namely Lotus Development Corp.'s 1-2-3. However, the two leading software vendors have decided to wage a war.

Microsoft Corp.'s Excel, for IBM-compatible systems, runs only on IBM Personal Computer AT-class or faster machines, so the upcoming battle is being fought only in certain provinces. Favoring Microsoft in this battle are a graphics user interface, better programming capabilities and more bells and whistles.

Excel runs under Windows 2.0, which gives users a glimpse of what IBM's Presentation Manager under Microsoft and IBM's OS/2 will look like. But the program will not run under OS/2 itself until the Presentation Manager ships in the fall.

Working against Excel is its greater hardware requirement that includes a mouse, lots of memory and disk space. What users get, however, is a product that is at least as good as 1-2-3 Release 2.01 is today.

But the question we have to ask is how much better and for how long? If a company's users are technological junkies and want a head start on using products running in a graphical environment, then recommend Excel. When the Presentation Manager becomes available next fall, that company will be ready.

Also in the running

But Lotus, with its arsenal of weapons, is not leaving users alone either. Its 1-2-3 Release 3 will be out in the first half of this year. It is a product that incorporates many items now on the wish lists of current users: faster recalculation speed, spreadsheet linking, three-dimensional spreadsheets, improved graphics and an UNDO command.

However, 1-2-3 Release 3 is character-based and doesn't have all the pretty things associated with Excel and Windows. The product will support links to other Lotus products and utilities currently available for 1-2-3. Lotus's 1-2-3/G is its next-generation spreadsheet running under the Presentation Manager of OS/2. It reportedly will be released when the Presentation Manager is available next fall. Little is known about 1-2-3/G, but one can be sure it will have the bells and whistles of Excel.

Morton Rosenthal

That is, until the next version of Excel is released.

This game of leapfrog, which vendors are sometimes fond of playing, does not always help users, and in fact sometimes results in unnecessary upgrading.

So what to do? We suggest that companies determine whether graphic interfaces are important to its users. If the answer is yes, then the question is whether to switch today to a product that gives a glimpse of the future or wait a year until Lotus's offering is available and Excel really runs under OS/2.

Of course, you do not have to choose sides. Many firms may adopt two spreadsheet standards. Thankfully, companies can choose to avoid the battle.

Rosenthal is chairman and chief executive officer of Corporate Software, Inc., a value-added reseller of software and peripherals based in Westwood, Mass.

"It's 6:33 pm. The lines are down. And she's the closest thing I've got to a technician.

Meanwhile, I've got a sales guy here waiting to close a half-million-dollar deal, and he's screaming 'why didn't my order go through.' I have no clue. My technical staff is home watching the game. And all I keep thinking is whatever happened to that word reliability? If I could have anticipated the problem, at least I would have had a chance. As far as I'm concerned, somebody at headquarters better start talking to AT&T about getting a network management system. Or they can find themselves a new whipping boy.

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Scannell

FROM PAGE 25

the company will formally introduce Modern Jazz at the Mac Expo and Symphony 2.0 the same week. Besides the lack of copy protection, the new Symphony features various enhancements to its spreadsheet and word processing functions, along with a couple of add-ins. Also by month's end, Lotus is expected to introduce a version of its Manuscript word processor. Manuscript and Symphony are set to ship a couple of weeks after the announcement, with Modern Jazz slated for shipment by the end of March.

MIS Gamesmanship 101. Have some of you MIS managers wondered why you get a negative user response to what seemed a logical project? Or a great response to something that appeared to you to be a throwaway idea? Well, wonder no longer. N. Dean Meyer and Associates has introduced Gameplan, an expert system that simulates the political response of an organization to actions MIS managers take. The game teaches the "political dynamics of innovation" by designating you the manager of end-user computing for a hypothetical company. As your game plan unfolds, the expert system critiques your decisions and gives you immediate feedback.

The goal, according to the vendor, is to come up with a series of moves that result in the adoption of new information tools.

Year of the laptop — Part V. Once again, a market researcher predicts the laptop market is about to take off. Venture Development released a study last month that said the revenue growth in the laptop market in 1987 will continue through 1992, when total market revenues will reach $2 billion. Laptop systems have failed to meet their predicted potential because of high prices and the poor quality of their displays, according to the study.

However, improvements in laptop component technology, major new competitors coming into the market, deep price cuts and the "beginnings of a recovery in the personal computer market" will create unprecedented demand for the systems. Hmmm. Well, if the laptop market fails to come through in 1988, it will be in a flat-footed tie with networks for technology trends that failed to materialize.

Until strategic incompatibility do us part. A little more than 60% of all high-tech mergers and acquisitions in the software, services and information industry succeed, while about 35% end in d-i-v-e-s-t-i-t-u-r-e, according to a recent study by The Cerberus Group. The key to most happy high-tech marriages is a combination of the right price and strategic fit.

Scannell is a *Computerworld* senior editor, microcomputing.

ALR line

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backup and a 3½-in. 1.44M-byte floppy, adding to the compatability with the new PS/2 systems, according to the spokesman.

List price for the 16-MHz 80386 Model 60 with a 66M-byte hard disk is $4,690. The 16-MHz 80386 Model 100 with a 100M-byte hard disk retails for $5,690. The 20-MHz models, the Model 150 with a 150M-byte hard disk and the Model 300 with a 300M-byte hard disk, sell for $7,490 and $9,990, respectively.

Claris

FROM PAGE 25

$495, is positioned as a medium to high-end project-management tool. Priced at $195, the original Macproject was targeted at entry-level users. Doug Cobb, product manager for Macproject II, said the decision to make obsolete the original product in favor of the more advanced version was made by dealers.

"We wanted them to carry both products, but they wouldn't because of shelf space," Cobb explained. "They wanted only one Macproject, and the one they chose had the higher price point." Shipment begins this week. Current users can upgrade for $145.

The new package can display up to 16 attributes per task and offers hierarchical subproject consolidation and the ability to customize project tables.

Macpaint 2.0 offers the ability to erase the last drawing without destroying the earlier version of the picture. Macdraw II, which is based on new code, allows object and text rotation, increased speed and the rescaling of objects.

Macpaint 2.0 is priced at $125 and is scheduled for shipment this week. The upgrade price for current users is $25. Macdraw II, priced at $395 — reduced from an original $195 — is scheduled for shipment during the second quarter.

Formed last spring, Claris was established to market applications software for Apple products, particularly the Macintosh. Current plans call for the subsidiary to be spun off from Apple by year's end.

Both Apple and Claris officials have reasoned that the formation of Claris will improve Apple's relationship with its third-party software developers, since it removes the Apple logo from that marketplace. Claris and Apple officials have declined to name the amount of Apple's contribution to the subsidiary.

Repackaging and upgrading existing Apple products represents the first phase of Claris's business plan, which also calls for product and technology acquisitions as well as packages resulting from in-house development programs.

Zeisler said Claris will participate in markets in which it has the opportunity to become the leader or No. 2 player. "No one remembers No. 3," Zeisler explained. "It's safe to assume that we won't get into the spreadsheet market. Microsoft Corp. is doing a good job there."

Zachmann

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Adapter or compatible system, but the resolution leaves much to be desired. Similarly, it can run on a 4.77-MHz Intel 8088-based IBM PC XT or compatible. But even with its greatly improved performance over earlier versions, Windows 2.0 is still too slow for most users.

A 6-MHz PC AT or compatible with an EGA or compatible display, however, delivers satisfactory performance for most applications with Windows 2.0. The faster 8-, 10- and 12-MHz PC AT systems (and even 8-MHz 8086-based systems such as the PS/2 Model 30) will do even better.

A better alternative

Until the Presentation Manager is available next fall, Windows 2.0 will be the only practical way for users of 80286-based systems to get a graphics-based user interface. Even after the Presentation Manager is delivered, Windows 2.0 will likely remain a better alternative for many users.

The higher cost of OS/2, along with the amount of resources it requires, should make the Windows 2.0/DOS combination a more practical alternative for some time. Many users will find this combination preferable to spending what it will take to upgrade their systems to run OS/2.

A 10-MHz 286-based system with a single 20M-byte hard disk, for example, is barely sufficient to run OS/2 Standard Edition — even if it has the 3M to 4M bytes of memory that OS/2 needs to do anything useful. Nevertheless, there are many systems of this sort installed with 1M byte of memory or less. At $99, Windows 2.0 will be hundreds of dollars less than the memory and disk (if not system) upgrades that will be needed to support OS/2.

Applications growing

The fact that Windows 2.0 offers the same user interface as the OS/2 Presentation Manager — and does so almost a year sooner at much lower cost — is not sufficient reason to buy it. Sure, some users may want to get an early feel for what the Presentation Manager will be like. But more compelling reasons for using Windows 2.0 are appearing every month — namely the growing number of excellent applications that run under Windows and that will eventually be made available under the Presentation Manager.

Some of the terrific software written for Windows includes desktop publishing applications like Aldus's Pagemaker; graphics design packages like Micrografx's Inavision, Draw and Graph; ZSoft's PC Paintbrush; office automation packages like Palantir Software's Windows Filer, Windows Intalk, Wintext and others; Microsoft's own Excel spreadsheet; and other specialized products.

There is no question that most of the exciting and important software to be developed during the next four or five years will be written for Windows and the OS/2 Presentation Manager. Windows 2.0 offers by far the best and most economical way for the largest number of users to begin taking advantage of that software now.

Unless you are among the elite minority fortunate enough to have a 386-based system (in which case Windows 386 is an even better alternative), I suggest that you run, not walk, to your nearest computer store and get a copy of Windows 2.0. There is no reason to miss out on so much when the cost of admission to the future is so low.

Zachmann is vice-president of research at International Data Corp.

Oracle

FROM PAGE 29

keep some of his personal data on the PC. So the ideal arrangement is to have things that I want to keep locally on my PC but also to be able to get at data remotely on another PC, minicomputer or mainframe. But I want it all to be transparent.

Do you see IBM's OS/2 Extended Edition as being competitive on the micro side?

If I look at all the new competitors entering the PC data base arena in 1988, I think IBM ranks third among my concerns. Both Microsoft and Lotus will be entering the marketplace and, in that order, are my two biggest concerns. IBM has yet to produce a successful PC product. Maybe this will be the first, but maybe not.

Let's assume it becomes successful because it's bundled with a version of the operating system.

That's interesting. OS/2 Extended Edition is a peculiar name for a DBMS. All Extended Edition is is a DBMS and the network driver for LU6.2. If you have an SQL DBMS and a piece of communications software, why, in God's name, did they call it OS/2 Extended Edition? It's a ridiculous name. We could call Oracle OS/Z Extended Edition. It has nothing to do with OS/2. OS/2 was written by and is owned by Microsoft. The only thing IBM does is act as a public relations agency for Microsoft by holding the parties and announcing it a month before everyone else gets it.

How will Oracle take advantage of that product if it becomes popular?

Well, if it did become popular, I suppose we'd do the same thing we do with DB2, which is have a coexistent strategy where we treat the IBM SQL PC's DBMS the same way we treat DB2 — include it in the network computer.

However, I expect that OS/2 Extended Edition will be just as popular as Topview, their great window-management package. IBM put their full marketing muscle behind Topview.

How quickly are PC managers realizing that true relational is important?

If they're networking their computers together, they're beginning to find serious deficiencies in the technology.

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to inject even more speed into disk-intensive applications and both will run MS® OS/2.

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NEW PRODUCTS

Software applications packages

A data base search software program called **Friendly Finder** has been announced by **Proximity Technology, Inc.**

Friendly Finder searches fixed-length ASCII files and Ashton-Tate Corp. Dbase files. It offers pop-up windows and a macro feature that allows record information to be brought back to the user's current application. According to the vendor, Friendly Finder can find records despite errors typical of data base queries or entries, including typos, abbreviations, missing words or words out of order.

Friendly Finder is priced at $99.

Proximity, 3511 N.E. 22nd Ave., Fort Lauderdale, Fla. 33308. 305-566-3511.

Software utilities

Two versions of a computer-based workstation management system have been introduced by **Leader Systems, Inc.**

Workstation Wizard, available in single-user and network versions, is said to organize the hard-disk system using standard Microsoft Corp. MS-DOS commands for direct access to applications and batch files.

Support is provided for both IBM's Token-Ring and PC Networks. Hardware and direct access to IBM and Novell, Inc. network commands is also standard. Features include an audit trail, a terminal-lock option, context-sensitive Help, 16 colors, an autodialer and access to a four-function calculator.

The single-user version of Workstation Wizard costs $79.95. The network version costs $179.95.

Leader Systems, 814 Livingstone Court, Marietta, Ga. 30067. 404-428-7971.

Development tools

A window management library for Microsoft Corp.'s Quickbasic has been announced by **Software Interphase, Inc.**

Quickwindows provides the Basic programmer with the ability to create windows, pop-up and pull-down menus, Help windows and data entry screens. It features more than 60 functions, the vendor said, which can be accessed through Basic using the CALL statement.

The programmer has control over the style, size and attributes of each window, and each window has its own cursor.

Quickwindows is priced at $79 without source code and $99 with source code. It runs on IBM Personal Computers and compatibles.

Software Interphase, Suite 13, 5 Bradley St., Providence, R.I. 02908. 401-274-5465.

Freeform for the Macintosh, said to provide a uniform user interface to relational data base systems on host computers from such vendors as Digital Equipment Corp., Apollo Computer, Inc. and Sun Microsystems, Inc., has been introduced by **Products Diversified, Inc.**

Freeform is a fourth-generation application development tool that allows the hosts to communicate with Britton Lee, Inc.'s Intelligent Database Machine (IDM). The product includes a screen generator and a report generator.

According to the vendor, IDM can support more than 400 Apple Computer, Inc. Macintosh computers. It handles data bases of up to 10G bytes and provides data sharing among different hosts and operating systems.

Prices for Freeform start at $5,500 for a five-Macintosh license. Britton Lee's IDMs start at $30,000.

Products Diversified, No. 406, 9720 Beechnut, Houston, Texas 77036. 713-771-8357.

Software enhancements

An enhanced version of **Abra 2000**, a human resource system for the IBM Personal Computer and compatibles, has been announced by **Abra Cadabra Software.**

Version 5.5 is said to provide multiuser update capability across IBM PC networks. Other features include a general-purpose mass-update utility, a telephone directory and masked password entry.

Abra 2000 supports networks from Novell, Inc., 3Com Corp. and IBM.

Abra 2000 costs $995. The multiuser network option is an additional $995.

Abra Cadabra Software, 1894 Tanglewood Drive NE, St. Petersburg, Fla. 33702. 813-525-4400.

Data storage

Micro Design International, Inc. has announced the **Laserbank 800**, a write-once read-many (WORM) optical disk.

The Laserbank 800 is said to offer a 65-msec access time and a DOS throughput greater than 200K byte/sec. According to the vendor, the Laserbank 800 emulates a removable hard disk with 800M bytes of storage space.

It interfaces to IBM Personal Computers and compatibles via the vendor's proprietary software and a small computer systems interface card.

The Laserbank 800 costs $9,995; optical cartridges cost $150.

Micro Design, 6985 University Blvd., Winter Park, Fla. 32792. 305-677-8333.

DATA STREAM

Tom Nolle

Prepare for ONA battles

Common carriers must file their Open Network Architecture (ONA) plans with the Federal Communications Commission by February, after which we'll all have a better idea of just what ONA is going to mean to users, be they businesses or enhanced-service providers.

ONA is a stepchild of divestiture that seeks to remove the restrictions on the divested Bell operating companies' entry into the enhanced-services market while maintaining free competition there. In concept, ONA would require regulated common carriers to publish and tariff the "primitive" service interfaces they themselves might use to provide such enhanced offerings as videotex or information services.

This would assure competitive special service carriers equal access (haven't we heard that one before?) to those backbone facilities they must use to carry their own enhanced offerings to local users. For example, if a local carrier introduces a packet-switching service as an inexpensive way for customers to access its electronic mail offering, then other E-mail vendors ought to be able to offer that same packet-switching service to their own customers — at a comparable cost.

Unfortunately, the language of Computer Inquiry III was

Continued on page 40

Network links Chrysler, dealers

Auto maker's Profs tied to GE Information Services' E-mail system

BY ELISABETH HORWITT
CW STAFF

DETROIT — GE Information Services, a division of General Electric Co., recently completed an electronic mail network for Chrysler Corp. that will support daily interaction between the automotive company and up to 6,500 of its dealerships.

In 1986, Chrysler was looking for a way to allow its 31 zone offices in the U.S. and Canada to stay in touch with the dealerships as well as with Chrysler's 600 district managers, who are assigned to work with specific dealerships on an ongoing basis.

Prior to linking up with the GE network, Chrysler had a "not very sophisticated" system called Dealer Information Access Link, according to David Bartlo, Chrysler manager for field and zone systems.

Each dealer was equipped with an IBM Personal Computer or PC AT that could emulate a teletype terminal, dial into the corporate mainframe and download a file containing the latest dealer information. "But there was no way of directing mail to a specific group of dealers or of getting information back from them easily," Bartlo explained.

Two-way information

Chrysler wanted to build a two-way E-mail system that would allow dealers to access and respond to information provided on the firm's mainframes. The system would also allow district managers on the road to keep in touch with personnel in zone offices, which meant the system would have to interface with an existing E-mail network, IBM's Professional Office System (Profs), which zone office users accessed on a host at Chrysler headquarters.

After evaluating six companies, including MCI Communications Corp. and Western Union Corp., Chrysler chose GE because "they came out on top in terms of service and functionality," Bartlo said. Cost was also a factor in the decision, be added.

GE was "somewhat ahead of their time" in terms of interfacing Profs to the service vendor's own E-mail service, Quik-Comm, according to Bartlo. Messages generated on Profs and addressed to either a district manager or a dealer are now sent on to the Quik-Comm system, which converts them into a format that can be accessed by the IBM PCs used by dealers and by Grid Systems Corp. computers used by Chrysler district managers on the road.

Both types of PCs run a customized version of GE's PC Mailbox, a front-end software package that automates many of the user's dealings with Quik-Comm. "We wanted a neat package to run on a PC and gather and send mail to the system without a lot of intervention by [the user], since [dealerships get] a lot of turnover," Bartlo said. While other bidders had front ends, GE's software was "equal to or better" than its rivals.

The package is "tied tightly to the network, so that you can automatically sign on, send, receive mail and sign off," said David Hall, an account executive for GE. It also is said to permit the creation of messages on the PC before signing onto Quik-Comm.

Electronic forms

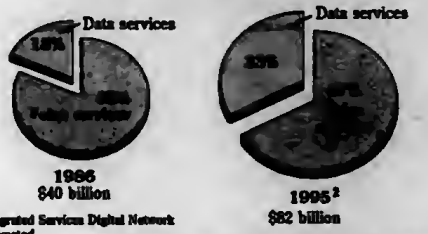
One of the more innovative projects that has come out of Chrysler's relationship with GE, according to Bartlo, is a jointly developed forms-processing package. Chrysler can use the software to develop an electronic form, such as a survey or a sign-up sheet for dealers to join a new incentive program. Chrysler notifies dealers about a new handout via Quik-Comm. Deal-

Continued on page 40

Data View

Data messaging gains in voice transmissions

Aided by ISDN[1] economies, data services should hold a third of the market share by 1995



[1]Integrated Services Digital Network
[2]Estimated

INFORMATION PROVIDED BY BUSINESS TECHNOLOGY RESEARCH
CW CHART

TRW plans TCP/IP offerings

TORRANCE, Calif. — A planned launch later this month of a family of Transmission Control Protocol/Internet Protocol (TCP/IP)-based network products signals TRW Information Networks Division's move away from a traditional emphasis on proprietary protocols.

"We said that we were going to do this last January, and now we actually have the devices," a TRW spokesman said.

With a focus on network management, the line will include the NB2000 series of network bridges, network adapter cards and network management tools targeting local-area markets, the spokesman said. These products will work with TRW's Advanced Connector Unit (ACU) 2000, a TCP/IP-based communications server that shipped in October 1987.

The products will be demonstrated at the Communications Network Conference and Exposition, also known as Comnet, slated for Jan. 25-28 in Washington, D.C. TRW said some of its TCP/IP products have already shipped to early users; the rest will be available after the show.

Continued on page 40

Inside

Artel bridge links networks

HUDSON, Mass. — A bridge recently announced by Artel Communications Corp. reportedly allows users on multiple Ethernet IEEE 802.3 networks to communicate over Artel's 100M bit/sec. fiber-optic backbone.

The Fiberway 802.3 Bridge is an intelligent device that connects one Ethernet local-area network to the backbone. It can learn the addresses of all devices on the network attached to it so that it can restrict local messages to the network and send only remotely addressed transmissions over the backbone, according to Artel spokeswoman Etta Marie McCarthy.

One fiber-optic backbone can support up to 128 of Artel's multiple Fiberway Bridges. Bridges can also communicate over the fiber-optic cable with Artel's Ethernet Accelerator, which links any device with an Ethernet interface to the fiber-optic cable. An Ethernet network is linked to a Fiberway Bridge port via an Ethernet transceiver and a drop cable.

Both the Fiberway Bridge and the Ethernet Accelerator are available in two versions, one of which supports transmission over distances of up to 2,000 ft; the other communicates over distances of up to 13,000 ft. Priced at $19,000, the Fiberway Bridge is slated for volume shipment next month.

Rivals provide direct connection between services in U.S. and Japan

Two U.S. rivals late last month claimed to be the first to provide customers with a direct link between their U.S.-based value-added network services and packet-switching services in Japan.

A direct connection was announced Dec. 18 between GE Information Services in Rockville, Md., and NEC Corp.'s network in Japan. The service will initially support the Information Services division's Quik-Comm electronic mail offering.

It can be accessed by approximately 200 locations in Japan, 650 locations in the U.S. and from more than 80 additional countries around the world, according to GE.

On Dec. 21, Tymnet, a San Jose, Calif., subsidiary of McDonnell Douglas Network Systems Co., unveiled a link between its own service and that of its Japanese affiliate, Network Information Service, Ltd.

Both offerings were made possible by a recent deregulation of the Japanese telecommunications market.

BIT BLAST

France offers ISDN service

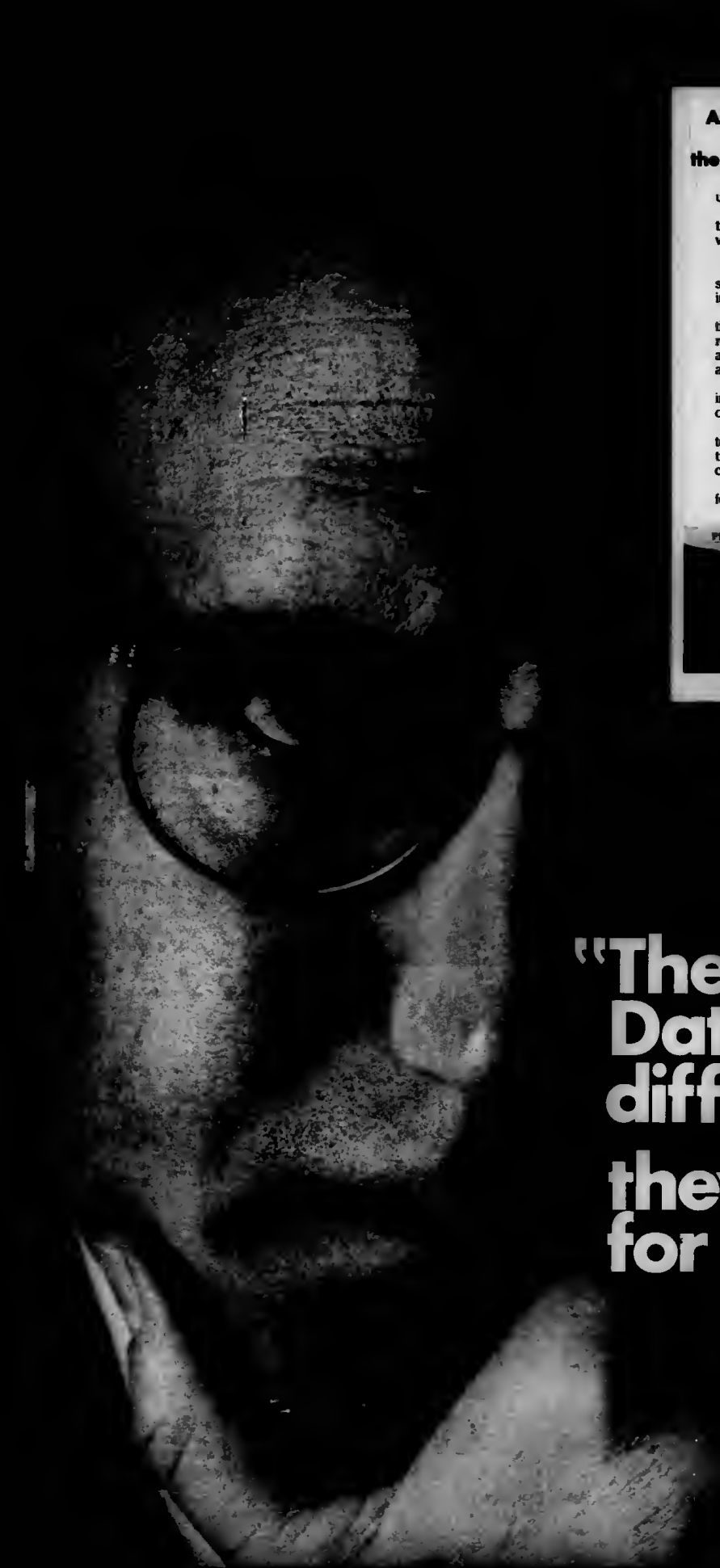
France recently launched its first commercial **Integrated Services Digital Network** (ISDN) offering in the Brittany region. The network will be extended to other parts of the country during the next couple of years, with the first international connections to be added in 1989.

The ISDN service provides basic rate connections, which support two 64K bit/sec. digital channels. Rates range from 34 cents to $1.14 per minute. A primary rate service, which will consist of 30 64K bit/sec. channels (as opposed to the U.S. standard that defines 23 channels), is slated to be offered in France next year.

NCR Comten has announced that its Advanced Communications Function/Network Control Program (ACF/NCP) Version 4.0 will support IBM's Systems Network Architecture (SNA) Network Interconnect feature. This allows communication among nodes on different SNA networks. The vendor said it will continue to offer users the Comten Network Gateway as an alternate way to interconnect multiple SNA networks. Comten ACF/NCP Version 4.0 runs on a Comten 3690/3695 or 5600 communications processor and performs routing functions within an SNA network.

LANwatch Version 1.1, the latest network protocol analyzer software from Boston-based **FTP Software, Inc.**, reportedly analyzes Digital Equipment Corp.'s Decnet, Novell, Inc. and Xerox Network Systems packets. It also monitors network traffic on Pronet-10, Proteon, Inc.'s 10M bit/sec. token-ring network. LANwatch Version 1.0 could only analyze Transmission Control Protocol/Internet Protocol packets running over Ethernet local-area networks.

Datatel, Inc., a manufacturer of data communications equipment based in Cherry Hill, N.J., has earned 156th place in *Inc.* magazine's list of the 500 fastest growing private companies in the U.S. In a separate study published by the *Business Journal of New Jersey* in September 1987, Datatel ranked 10th in rate of growth among New Jersey companies. Datatel was recently acquired by the Dowty Group PLC, a $1 billion company based in Cheltenham, England.



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Nolle

CONTINUED FROM PAGE 37

vague on the details of ONA — the court, in essence, said, "We'll know an open interface when we see one."

Carriers' ONA submissions this month are bound to be trial-and-error efforts to satisfy the spirit of the ONA concept. This leaves plenty of room for more court battles between carriers, vendors and regulatory bodies — when the telecom market is already reeling under technological, regulatory and economic changes.

One reason the various parties are likelier to fight than parley is the fact that a lot of them really hate ONA. The regulated carriers see it as a license for competitors to stand back while basic service technology is developed by the carriers at great expense, and then move in to reap the economic benefits. State regulators see it as a means of justifying the investment of residential revenues in the provision of service mechanisms (the ONA interface itself) that will likely be of little use to the residents. Technical specialists believe ONA will yank telecommunications out of the lab and into the courtroom.

Benefits overlooked

What makes the upcoming ONA fight so frustrating is the fact that recent standards efforts will soon open up the carriers' networks in very practical ways. Integrated Services Digital Network (ISDN) promises international standards for interfacing customer-premise equipment with carrier services.

Signaling System 7 (SS7) is a set of protocols that should play a key role in ISDN. SS7 is supposed to allow the switching devices of carriers, and maybe even users, to exchange signaling and control information on a peer-to-peer rather than a hierarchical basis.

This will make it easier for users' and service providers' networking systems to participate in the sophisticated network offerings that carriers will provide through ISDN, including network diagnostics and accounting, call routing and identification. It also will allow enhanced-service providers — the Tymnets and Telenets of the world — to wield network control with the big boys regardless of where their switches attach to the "basic services network."

None of this will satisfy the FCC's current definition of ONA, however — because that definition is an ideal, rather than a rule. No matter what we do as an industry to address the problems of the separation of regulated and enhanced services, concepts like ONA will be interpreted differently by the players in the market, and the user will pay the price of the resulting confusion.

We don't have a government-sponsored telecommunications industry, so many observers seem to feel that the direct setting of standards in the manner of the CCITT and the European Postal, Telephone and Telegraph organizations is inappropriate in the U.S. But is it? What better way to regulate something than to specify how it must appear to its users — whether those users be businesses or enhanced-service providers?

Maybe it's time to consider formalization of standards in a more legal sense, and to avoid the generation of broad pronouncements until they can be fleshed out enough to provide real market guidance.

In the meantime . . . see you in court.

Nolle is president of CIMI Corp., a communications consulting company based in Haddonfield, N.J.

Chrysler

CONTINUED FROM PAGE 37

ers can download the forms, fill them out and send the data back electronically to the Chrysler host, which can then tabulate the responses. Chrysler is working on a way for dealers to sign up for a program via an electronic signature.

The auto maker's first application of the forms generator, Bartlo said, was designed to improve customer relations. A customer's query or complaint is keyed into the system, and an electronic message is sent to the appropriate district manager and the dealer. One or the other then fills out a form with a recommendation of follow-up and sends it on to the zone office for review and then to headquarters for final resolution.

GE won the Chrysler contract in October 1986, in a bidding war against such competitors as MCI and Western Union, Hall said. Today, all of Chrysler's domestic North American dealers are using the network, except for the newly formed AMC Jeep Eagle division, which will be brought up by June.

TRW

CONTINUED FROM PAGE 37

The NB2000 series covers 11 bridges that provide TCP/IP support for a variety of networks and between a mix of those networks. Six bridges support IEEE 802.3 local-area networks. The other five support remote connections by linking remote 802.3 LANs over T1 lines, fiber and broadband cable. The bridges range in price from $5,495 to $7,195.

Three network adapters for IBM Personal Computers and compatibles will be available in intelligent or nonintelligent versions, and each comes with TRW's OS Connection software. The adapters are priced from $495 to $670.

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NEW PRODUCTS

Local-area network hardware

A subsystem package designed to provide 3Com Corp. network compatibility to an 800M-byte optical disk drive has been unveiled by Spectracom.

The package consists of an optical disk subsystem, a small computer systems interface card, network drivers and software, one blank 800M-byte optical disk from Maxtor, Inc. and documentation. The subsystem also comes with its own power supply and external case.

The package is priced at $5,995.

Spectracom, 90 W. Easy St., Simi Valley, Calif. 93065. 805-527-2326.

Local-area network software

Autodialing Systems Network Architecture (SNA) and bisync software for the IBM Personal System/2 Models 50, 60 and 80 has been announced by **CQ Computer Communications, Inc.**

A 3270 SNA emulator, called **CQ-3270R**, supports multiple sessions, 132-col screens, extended data stream, IBM-compatible file transfer and mainframe-controlled windows. It costs from $395 to $795.

The **CQ-3770** package provides SNA RJE support as well as support for bidirectional compression and compaction and multiple printers. It costs from $495 to $695. A bisync RJE package, called the **CQ-3780**, costs $395. **CQ-Haste**, a bisync package, costs $750.

CQ Computer Communications, 5380 Capital Circle N.W., Tallahassee, Fla. 32303. 904-526-4255.

Links

Teleos Communications, Inc. has introduced the T100U Unibus Controller, said to provide communications between Digital Equipment Corp. VAX computers through T1 network lines.

According to the vendor, the T100U provides a full-duplex data transfer rate of up to 1.53M bit/sec. over T1-compatible transmission systems. Functions include parallel-to-serial and serial-to-parallel conversion, data formatting and deformatting, intelligent buffer management using direct memory-access transfers and VAX cluster-to-VAX cluster wide-area networking.

The T100U costs $4,000. Drivers for VMS, AT & T's Unix System V and the University of California at Berkeley's Unix 4.2 cost $400 each.

Teleos, 2 Meridian Road, Eatontown, N.Y. 07724. 201-389-5700.

Modems/ Multiplexers

A modem said to offer full network node functionality, remote configuration, Class 5 Microcom Networking Protocol (MNP) error correction and diagnostic capabilities has been announced by Western Datacom Co.

The **424 Network Node** was designed for operation over standard two-wire dial-up lines or two four-wire leased lines. It features synchronous or asynchronous operation, password protection, downward compatibility with lower classes of MNP, telephone number storage and integral autodialer.

Speed conversion up to 9.6K bit/sec. is supported.

The 424 Network Node is priced at $695.

Western Datacom, P.O. Box 45113, Westlake, Ohio. 44145. 216-835-1510.

A trellis-coded diagnostic modem has been announced by Data Comm for Business, Inc.

The **PL 19.2 Plus** is a 19.2K bit/sec. synchronous modem for use on four-wire point-to-point leased lines. Fallback speeds of 16.8, 14.4, 12 and 9.6K bit/sec. are supported. Diagnostic tests such as level measurement, status display and loop-backs are performed using an asynchronous terminal as a

Continued on page 46

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Only one can put

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When IBM set out to make the new computers, we could have simply installed a more powerful chip into our top PC performer, as some computer companies are doing. To us, that's just pushing an older technology to its limits.

Instead, we broke ground with a new technology. One that would maintain links to earlier PCs, meet our customers' needs for more power and performance, and serve as a platform for future growth.

For instance, you wanted us to give you more standard features, and we did, but not by plugging cards into the machine. Instead, we came up with a quieter, more reliable, more compact solution—an integrated planar board with parallel, serial and mouse ports, even advanced graphics, built in.

In fact, the entire technology was developed from a "total system" philosophy—using IBM components, and IBM chips, specially designed and integrated to send overall performance and reliability up, and costs down.

We could even have been content to direct information through a traditional "single bus" highway. Instead, we created a superhighway called Micro Channel architecture in Models 50, 60 and 80, a much more efficient method of sending and receiving information.

We also introduced a new version of DOS which taps into the power of the new systems and runs current software better. And we just unveiled a new operating system, OS/2, that opens up a world of possibilities.

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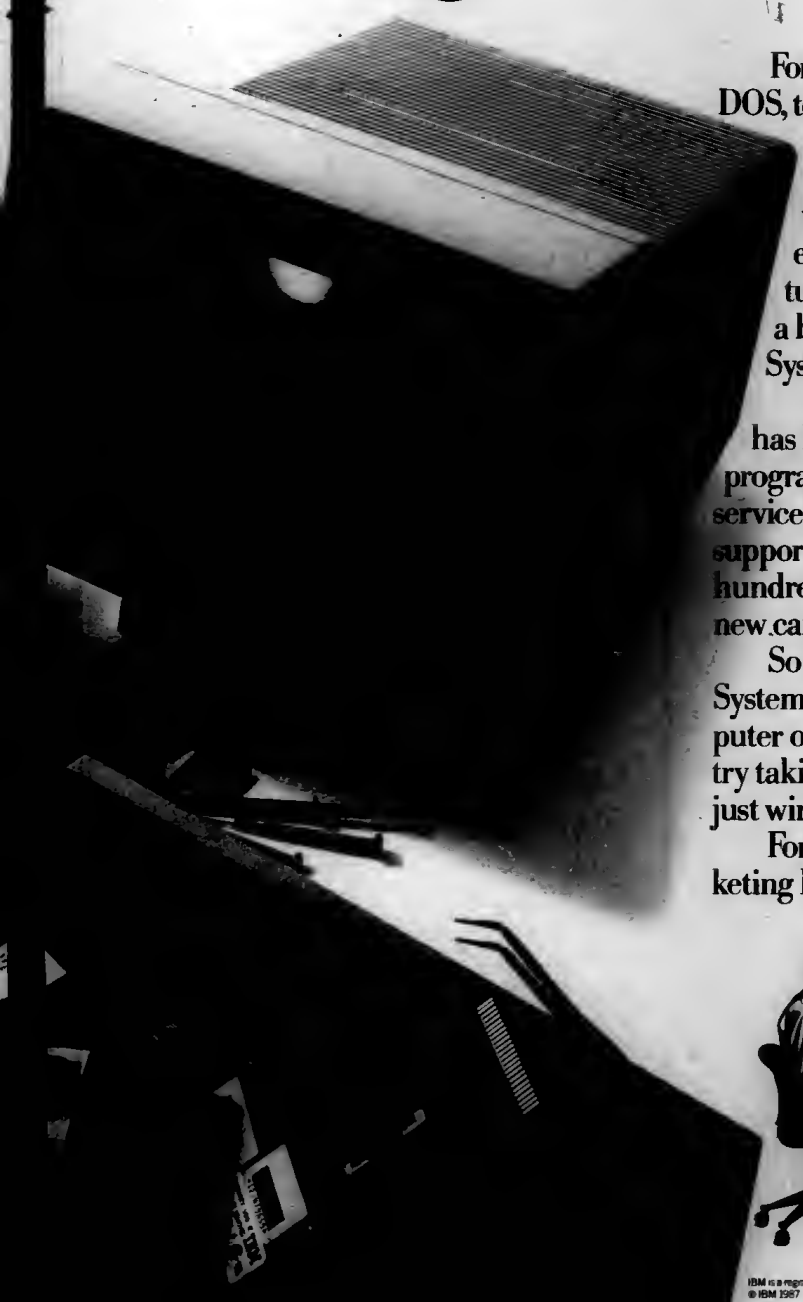

For starters, it's compatible with today's DOS, to protect your investment in hardware and software. It works beautifully with Micro Channel, to make multitasking easier. What's more, OS/2 establishes a consistent look for virtually all software and systems, part of a blueprint for the future we call Systems Application Architecture.

Even IBM's legendary dealer network has been improved. A special certification program gives dealers advanced training, so service and support are even stronger. In fact, support comes from many sources—right now, hundreds of outside developers are creating new cards, software and peripherals.

So you see, the world of the Personal System/2 is far greater than any single computer or chip or component. And when you try taking apart a system like this, you can just wind up with lots of bits and pieces.

For more information, see your IBM Marketing Representative or authorized dealer.

For the dealer nearest you, call 1-800-447-4700.

IBM

Continued from page 42

control console.

The PL 19.2 Plus is priced at $4,900.

Data Comm for Business, 807 Pioneer, Champaign, Ill. 61820. 217-352-3207.

Two synchronous rack-mount modems have been announced by Racal-Vadic, Inc.

The VA9691FT 9.6K bit/sec. modem and the VA4891T 4.8K bit/sec. modem were designed for use with the vendor's MDS II network management system.

The VA9691FT offers CCITT V.29 and V.27 compatibility. The VA4891T operates as an AT&T 208/201 and CCITT V.27/26 modem. It features automatic modem detection.

Both modems operate over two-wire dial-up and two- or four-wire leased lines.

According to the vendor, up to 16 modems can be mounted in one MDS II chassis.

The VA9691FT costs $1,995; the VA4891T costs $1,695.

Racal-Vadic also announced the VA901 automatic dialer for the MDS II. It offers four Bell 801 dialers per card and costs $1,195.

Racal-Vadic, 1525 McCarthy Blvd., Milpitas, Calif. 95035. 408-432-8008.

Mux Lab's Double Octopus

Cabling

The Double Octopus, a cabling product for use in IBM 3270 environments, has been announced by Mux Lab, Inc.

The Double Octopus is said to eliminate coaxial cable leads at the controller side. According to the vendor, ports may be wired from controllers to patch panels or punch-down blocks via a 25-pair feeder cable.

It features a 16-port balun assembly connected via 16 5-ft air cables to a 50-pin male connector. It works in conjunction with the vedor's Monoplex, Monofrill and Economono coaxial baluns.

The Double Octopus costs $470.

Mux Lab, 165 Graveline, St.-Laurent, Que., Canada, 84T-1R3. 514-735-2741.

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EXIDE ELECTRONICS Raleigh, North Carolina

HARD TALK

James Connolly

IBM dives into supers

A toe-test showed that the water was fine, so now the big guy is jumping into the pool.

IBM made its official entry into supercomputing with the December announcement that it is investing in Supercomputer Systems, Inc., the start-up founded by former Cray Research supercomputer designer Steve S. Chen. Supercomputer Systems expects to deliver a 64-processor supercomputer to rival Cray's high-end systems in the early 1990s.

Supercomputer boosters see IBM's move as an endorsement of parallel processing and supercomputing and as a turnabout in IBM's strategy.

But it should be remembered that IBM has been testing the supercomputing waters for more than two years with its 3090 mainframes equipped with vector processing facilities. IBM has used those 3090s to get into customer sites that might be served by lower end Cray systems and minisupercomputers. In addition, IBM researchers have worked on various projects aimed at developing parallel processors.

With its investment in Supercomputer Systems, IBM is positioning itself for a battle with supercomputer makers such as Cray — the company Chen left after it canceled Chen's Cray MP development effort.

Continued on page 54

Pump maker purges systems

Turns 'doomsday situation' around with System/38, new personnel

BY KATHY CHIN LEONG
CW STAFF

PORTLAND, Ore. — When he came to the MIS operation at Bingham International, Inc. in 1986, Dick Kuiper was downright embarrassed.

Not only were the firm's four host systems incompatible, but they also had not received operating system upgrades in four years. Without system purge routines, disk space was nearing the overflow mark, and no one knew how to flush out old files. He walked into a doomsday situation.

Kuiper, the firm's manager of information systems, says that today, the $30 million pump manufacturer is ready to tackle front-line responsibilities that will make Bingham even more competitive. "Rather than focusing on day-to-day operations, we want to broaden our scope of services to take our company further," he says.

Kuiper wants to capture more data from the field offices and help the engineering and

Dick Kuiper

marketing personnel in post-sales analysis and forecasting. "We want to help them wrap their arms around profit and management," he says.

A single IBM System/38 has replaced the four host systems. New MIS personnel are on board who have brought with them a fresh outlook on systems management.

When Kuiper was hired in June 1986, his mission was clear: Get this shop in shape. After a 16-year stint as MIS director at paper giant Boise Cascade Corp., Kuiper was ready to tackle new opportunities and challenges.

The challenge was monumental. In just one year, the MIS, hardware and software departments were completely replaced. The problems that plagued the operation stemmed back to the 1970s — a time when Bingham was experiencing unbridled growth. According to Kuiper, at that time, "they wanted a computer system fast, and they hired the wrong people." Every two years, a new MIS director joined the firm, bringing in his own form of management and hardware preference.

One decade and four MIS directors later, the MIS department had an IBM 4341 small mainframe, a Prime Computer, Inc. 500 series superminicomputer, a Honeywell, Inc. Level 6 minicomputer and an IBM Series/1 minicomputer. Vital applications such as inventory management, manufacturing resource planning, accounting and order entry resided on separate machines, making cohesive data collection difficult.

The Series/1 was used as a communications controller for terminal-to-mainframe connectivity. But users could only access either the Prime or the IBM system and were not able to transmit data from one host file to another.

'Computing islands'

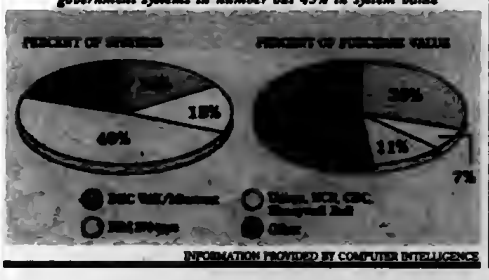
"In many cases, the data transfer was done either through reformatting magnetic tapes or reentering data manually," Kuiper says. "You had these different computing islands, and we had an army of clerks rowboating to each of these islands. The hope was that someday these would be linked all together." However,

Continued on page 52

Data View

Mainframe domination

IBM and compatible mainframes make up 11% of federal government systems in number but 49% in system value



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE

Imagen speeds up printers

SANTA CLARA, Calif. — Imagen Corp. recently extended its line of laser printers with the introduction of two printers that the company claimed achieve true printing speeds of 20 page/min.

The 5320 Imageserver XP and the 6320 Imageserver XP are based on a laser printer engine and a raster-image processor. Like other Imageserver XP models, the new models feature Imagen's Real-Time Rasterization techniques, which were designed to reduce the time required to format data and to allow each engine to print at its rated speed.

The 5320 and 6320 were designed for use in work group environments as shared printer resources.

Support graphics, text

Imagen said the products can handle full-page combinations of complex graphics and text for applications in the computer-aided engineering, design, publishing, printing and document-processing markets.

The 5320 is aimed at applications that involve high-volume

Continued on page 52

Inside

Introducing the DPS 7000 terms, it would be a Ferra

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than computers. Honeywell Bull

Micropolis develops parallel drive array

CHATSWORTH, Calif. — Micropolis Corp. recently introduced a set of five 5¼-in. Wincester disk drives that, acting together, can exceed the capacity, transfer rate and reliability of many 8- and 9-in. drives, according to the vendor.

The Model 1804 small computer systems interface (SCSI) drive subsystem can store 1.5G bytes of data and provide a sustained data rate of more than 4M byte/sec., the vendor claimed.

The Model 1804 SCSI uses Micropolis 380M-byte drives, each with a 1.25M byte/sec. data rate. Four drives in the assembly combine to appear to the CPU as one drive storing 1.5G bytes of data. The fifth drive offers redundancy and allows a failed drive to be replaced without taking the system off-line.

Drives work together

"The motors of the drives are synchronized," said Tom Kent, Micropolis marketing manager. He said an electronic signal is used to line up all the drives. As a result, the drives perform the same task together. Data is sent to the drives, 1 byte to each disk. A fifth byte, the parity byte, is used to reconstruct data in case of disk failure. It goes to the fifth disk.

Micropolis intends to sell the drive array to builders of superminicomputers, high-end workstations and graphics and image processing systems.

The Model 1804 SCSI has the advantage of having a higher data rate and greater reliability than other OEM drives, Kent said. In order for the array to lose data, two of the drives would have to fail simultaneously, an unlikely condition under normal operating conditions, he said. Should a drive fail, it may be replaced on-site by personnel with minimal training, Kent added.

The Model 1804 SCSI drive system will sell in OEM quantities for $12,000. Evaluation units will be available this quarter for the same price, Kent said.

Imagen

CONTINUED FROM PAGE 49

printing on various sizes of paper, while the 6320 was designed for high-volume duplex printing. The duplex feature allows automatic printing on both sides of a sheet of paper.

Various host protocols allow the printers to be used with systems such as IBM mainframes, Digital Equipment Corp. minicomputers and engineering workstations. The printers support Imagen's Impress language and are compatible with files written for Adobe Systems, Inc.'s Postscript.

The 5320 costs $26,950, and the 6320 costs $29,950.

Pump maker

CONTINUED FROM PAGE 49

er, no plan for connectivity existed. "People thought it would just one day magically happen."

In the early 1980s, when the demand for industrial pumps tapered off, half the company was laid off, leaving a core of 750 employees. The data processing department, which had 35 employees, was cut to nine people. With more than 75% of the shop gone, many projects were left unfinished. The remaining DP employees found themselves as caretakers of what seemed like a hardware cemetery. There was no wiring-scheme document available to show what was installed in the building. There was no organized information detailing upcoming projects.

But Bingham finally saw that the key to the company's well-being lay in an efficient computer strategy. Management structured the new job so that Kuiper would report directly to the general manager of the company, Gary Loven.

Getting rid of the four older systems and replacing them with a single System/38 turned out to be more cost-effective than keeping them. Whereas Bingham had previously spent $1 million annually on operating costs, the company now spends $500,000 annually.

According to Kuiper's estimates, it would have cost between $4 million and $5 million in software and development time to create a communications link for the four older computers and to upgrade application software.

Since the files had never been purged, the day was fast approaching when the company would fill up its disk storage. The drives had a capacity of 4G bytes. "I really thought that we would have to just close the door on the shop and turn off the lights. It was a doomsday situation," Kuiper says.

The key to the solution was the acquisition of a $1 million System/38 Model 400 with 16M bytes of memory. With it came 100 terminals and 15 printers. New application software was created on the System/38 to handle the various manufacturing and accounting packages that were on the dissimilar machines. Slowly, new people were brought in to replace the previous crew. By mid-1986, a new department was in place.

Today, Kuiper says he is ready to take the company beyond the stage of fighting fires. With a new team and new hardware and software, the department is embarking on a second phase that will pump new blood into the company.

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	SPECS:	Trans. Per Sec.	Cost/Transaction[4]
SEQUOIA[2] SERIES 200	6 Processors	83	$11,200
TANDEM[3] VLX	4 Processors	26	$38,200
STRATUS XA2000	4 Processors	36*	$23,100

[1] Based on standardized ETI Benchmark. Results published by FT Systems Newsletter 1987 ITOM Intnl. Co. [2] Audited results published 10/12/87. [3] Using NonStop SQL.™ [4] Prices for systems. Sequoia $829,000. Tandem $995,000. Stratus $830,000.
*Audited results unavailable. Numbers based on estimates published in FT Systems Newsletter ITOM International Co.

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Laser printer sights Ethernet users

EL SEGUNDO, Calif. — Xerox Corp. targeted Ethernet network users with the recent introduction of a medium-speed version of its Xerox 3700 Laser Printing System.

According to a company spokesman, the Xerox NS 3700 Laser Printing System Release Four series can be linked with Xerox 6085 and 8010 workstations in an Ethernet local-area network. It offers 300 dot/in. resolution at speeds up to 24 page/min and prints text and graphics documents in paper sizes up to 11- by 17-in.

The printing system was designed for applications requiring specialized graphics publishing capabilities and computer-aided design drawings, the spokesman said. It uses Xerox's Interpress page-description language, which allows the system to receive data from any Interpress workstation or computer via an Ethernet network.

Key features include a 1.5M-byte very large-scale integration image generator, a 50M-byte hard disk and three input sources — a 1,500-sheet main tray, two 250-sheet auxiliary trays and a 2,000-sheet output stacker.

The NS 3700 can produce documents created with Xerox Viewpoint as well as third-party software running on Xerox workstations, the vendor said. The system is also said to produce documents from Digital Equipment Corp. VAX computers running Xerox Network Systems (XNS) software.

As an Interpress printer running XNS protocols, the system is reportedly fully compatible with other networked laser printers from Xerox, including the Xerox NS 8000 Laser CP.

The Xerox NS 3700 costs $33,985. It is available immediately, the vendor said.

Connolly

FROM PAGE 49

What remains to be seen is whether IBM is giving itself fallback security, whereby it can rely on Supercomputer Systems as a supplier if its own development efforts fail or prove too expensive.

It is clear that any alliance with a supercomputer maker will give IBM a range of offerings broad enough to cover — at least on paper — almost all segments of the computer market. That certainly will make IBM a competitor with Cray in arenas that demand high-performance machines — such as the U.S. government market — and could give IBM an edge over Cray, because it can package its own smaller systems with a supercomputer while Cray offers only supercomputers.

IBM also holds an edge over Cray and CDC, which makes supercomputers and smaller systems, just in terms of size. IBM can more easily afford to cut the price on a supercomputer with the knowledge that it can cover that loss with the sale of supplemental systems to the same customer.

International resistance

But the more interesting confrontations may be on the international front, where IBM's offering of a true supercomputer as part of a broad product line puts it up against Japanese vendors — including Hitachi, NEC and Fujitsu — that added supercomputers to their broad, general-purpose computer lines three years ago.

Those vendors have only recently made inroads in the U.S. supercomputer market with U.S. sales logged by Honeywell-NEC Supercomputers and Amdahl on behalf of Fujitsu.

If the partnership of IBM and Supercomputer Systems produces a supercomputer in the early 1990s, it could mean that in five years or less, there will be at least five companies — IBM, NEC, Hitachi, Fujitsu and CDC — offering broad ranges of systems extending into supercomputers.

Connolly is Computerworld's senior editor, systems & peripherals.

NEW PRODUCTS

Processors

NCR Corp.'s Microelectronics Division has announced a high-end hardware and software development system for its Geometric Arithmetic Parallel Processor (GAPP).

The NCR45SPDS development system is a single-instruction multiple-data processor development system that supports the development of operational and algorithmic software for GAPP-based systems. It runs on an NCR PC8 or other IBM Personal Computer AT compatibles.

Pricing starts at $28,500 for a single-array board system.

NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45479. 800-334-5454.

Graphics systems

Ultragraf. 88, a three-dimensional interactive computer-aided design and manufacturing display product, has been announced by Lundy Electronics and Systems, Inc.'s Computer Graphics Division.

Ultragraf 88 offers resolution of 4,096 by 4,096 pixels. It features Lundy's Ultragrafics software package, which provides standard subroutines for constructing, manipulating and plotting basic shapes and designs. Ultragraf 88 transforms approximately 100,000 3-D vectors per second, the vendor said.

The system includes a 21-in. monochrome monitor with an integrated keyboard and a deskside controller cabinet. Pricing starts at $45,995.

Lundy Electronics, 1 Robert Lane, Glen Head, N.Y. 11545. 516-671-9000.

Data storage

Two Data General Corp.-compatible disk controllers said to support 5¼-in. hard disk drives with a small computer systems interface (SCSI) have been announced by Zetaco.

The Model SCZ-1 emulates DG's Argus disk subsystem and runs under the AOS and AOS/VS operating systems. It supports up to seven SCSI disk drives and interfaces DG's Burst Multiplexer Channel.

The Model SCZ-2 emulates and replaces DG's Zebra disk subsystems and runs under the RDOS operating system.

The SCZ-1 costs $5,995. The SCZ-2 costs $2,695.

Zetaco, 6850 Shady Oak Road, Eden Prairie, Minn. 55344. 612-941-9480.

Terminals

Conrac Display Products Group, a Mark IV Industries, Inc. company, has reduced the prices of its 7351 series of ultrahigh-resolution color display monitors.

The 19-in. 7351 features horizontal scan rates from 48 to 64 KHz.

The Model 7350-I features 1,280- by 1,024-pixel resolution. The Model 7351-II offers a standard polished CRT.

The Model 7351-III features 1,024- by 768-pixel resolution with a horizontal scan rate of 47 to 50 KHz. The Model 7351-IV has a high-contrast CRT.

The monitors cost from $2,995 to $3,450.

Conrac, 600 N. Rimsdale Ave., Covina, Calif. 91722. 818-966-3511.

Printers/Plotters

Ioline Corp. has added Hewlett-Packard Co. Graphics Language (HPGL) emulation to its LP4000 and LP3700 large-format pen plotters.

The Ioline subset of HPGL output commands was designed to support a command set compatible with such computer-aided design and drafting software as Autodesk, Inc.'s Autocad.

Both plotters emulate Houston Instruments' Digital Microprocessor Plotting Language as well.

Plotters can be field-upgraded by users with the purchase of an HPGL read-only memory, priced at $150.

Ioline, 19417 36th Ave. W., Lynnwood, Wash. 98036. 206-775-7861.

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*All prices U.S. list.

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20 MHz, 80386 processor for high performance, AT-compatible desktop computing.

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Power That Means Something Better for Everyone. The AST Premium/386 is a sigh of relief to users trying to decide whether to support IBM's® vision of the future, or remain in the industry-standard world of compatible 80386 machines.

With 20 MHz, typical 0-1 wait-state operation, a 32-bit data path from CPU to memory and a fully arbitrated industry-standard bus, the AST Premium/386 is the first 80386-based, AT-compatible computer to provide the crucial multimaster functionality of IBM's Micro Channel™ architecture.

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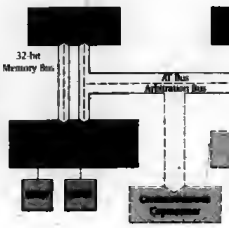
AST Premium/386 Architecture



AST's Multimaster Bus technology allows di memory for faster overall system throughput

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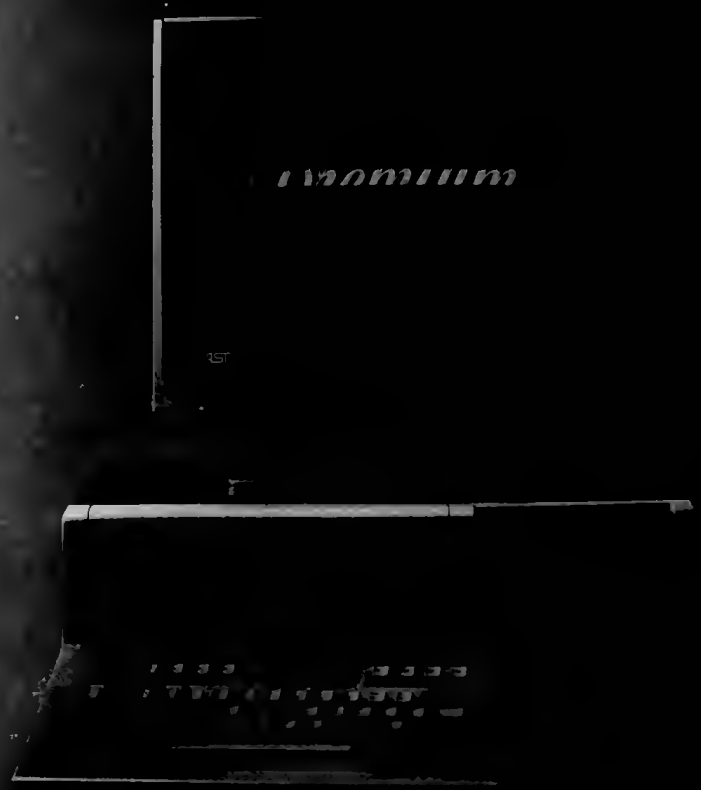

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Microprocessor	80386	80286	80286
Speed (MHz)	20†	10, 8, 6	10
Wait States	0-1	0	1
Standard Memory	Up to 2 MB	1 MB	1 MB
Expandable to	13 MB	13 MB	4 MB
Video Adapter	Optional	VGA/EGA/HGC (most models)	VGA/EGA/HGC module
Expansion Slots	7*	7**	2
Fixed Disk	40, 90, 150 MB	20, 40, 70 MB	40 MB
Diskette Size and Capacity	5¼" 1.2 MB 3½" 1.44 MB	5¼" 1.2 MB 3½" 1.44 MB	5¼" 1.2 MB 3½" 1.44 MB

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IN DEPTH

A directory of 1987 feature articles

In Depth presented 81 stories in 1987, covering technical and managerial topics plus implementation strategies. A special focus was PCs and end-user computing, with stories on high-return investments in end-user computing and how IBM's Personal System/2 fits into the network market.

In the technical arena, Chris Date presented 12 rules for distributed data base. In the industry, we reported on IBM as a manufacturing giant, and we explored MIS's climb up the corporate ladder. On a historical note, Alan Westin examined the state of the industry at the time of the Constitution's bicentennial.

Spotlight sections offered readers a pullout buyer's guide to 32 specific product categories, including network management tools, microcomputer security, the IBM DB2 market and the Apple Computer, Inc. Macintosh market.

Executive Report sections covered 12 implementation topics, from capacity planning to computer-aided software engineering. In addition, the section presented two executive roundtables, on software maintenance and hardware servicing.

Focus published 12 issues in 1987, each of which centered around a special section, such as departmental computing, software productivity and information centers.

Eleven special issues included two *Computerworld Extras*, on DEC and IBM, an industrywide salary survey and *Computerworld's* 20th Anniversary issue.

This index is intended to help readers locate articles on subjects of interest from last year. To order a back issue, call or write to the Back Issues Department, P.O. Box 9171, Framingham, Mass. 01701-9171, 617-879-0700, ext. 371. Each issue costs $2, prepaid by check made out to *Computerworld*. Issues published on Jan. 19; Feb. 9 and 23; March 9 and 16; May 4, 11 and 25; Aug. 12 (*Focus*); and Sept. 2 are not available.

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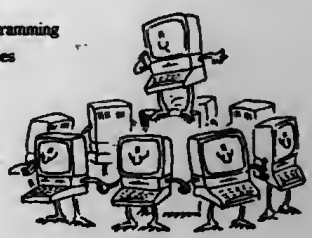

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Micro mismanagement

Four myths about PCs leave support budgets vulnerable to cost cutting

BY ALAN RADDING

Microcomputer management in the corporate environment is headed for a showdown. The problem, micro managers say, is that top management expects microcomputing to get easier and to require less and less corporate support. In fact, the reverse is true.

Consultant Ken Ross, president of Atrium Information Group in Fairfield, Iowa, points to a growing "support gap," citing a 32% decrease in corporate funds being spent on support, despite a surge of powerful new equipment into corporations.

Part of the problem is that microcomputer use in corporations continues to change rapidly, and microcomputer management teams must improvise to keep up. "I've had a business plan in draft form for three years," says Virginia Talamo, microcomputer technology manager at the New York office of Coopers & Lybrand. But Talamo says her plan has never been finalized because the sands of microcomputer support keep shifting.

Trying to keep up with corporate trends in managing PCs can lead you in circles. Early micro users were left on their own. Subsequently, management felt some control was needed and turned the job over to a reluctant MIS, creating a relationship that neither micro users nor MIS management liked.

Management then either set up an in-house department to supervise and support micro end users or contracted with outside support firms to fulfill the task. Costs continued to escalate.

Impatient with the ongoing cost of supporting micro users, top management is now cutting back the micro support departments it created. Often, microcomputing support is bounced back to the MIS department.

Many MIS directors covet the growing investment in microcomputers and cite the rise of connectivity to justify their claims on microcomputing. But Ross argues this can be dangerous. "The biggest mistake a company can make is to have end-user support report to MIS. End-user computing is different from MIS."

Other companies are leaving micro end users on their own once again. Still others rely on outside vendors that offer some of the services that in-house micro management would otherwise provide. In other cases, management is seeking support

ANTHONY RUSSO

Radding is a Boston-based author specializing in business and technology.

- **PCs cost $30,000 each to maintain**
- **Your firm may switch to outside support**
- **What kind of help do 'power users' need?**

from the hardware and software vendors themselves.

Commenting on the convoluted logic and conflicting attitudes that top management frequently applies to microcomputer use, Allen Sneider, partner in the Boston accounting firm of Laventhol and Horwath, says, "In a lot of cases, it is more like micro mismanagement than management." Sneider directs Laventhol's Computer Application Services, which supervises and supports all microcomputing in the firm's Boston office.

Allen Sneider

End users themselves are split on the kind of support they need, if any at all. Novice users require someone to show them which buttons to push to perform basic tasks. Other users, comfortable with their computing abilities to do the work at hand, may choose not to bother progressing any further. Highly experienced users do not need support so much as training on new applications. Some computer devotees do not want micro management exercising any control.

"Management's attitude is that if the work is getting done, they don't complain," says one micro manager at a large New York bank. "But at some point productivity suffers."

Management's pullback from a commitment to micro support comes, ironically, at a time when the number of end users is greatly expanding and the organization's investment in microcomputing is reaching extraordinary levels. With an entire new generation of desktop computers in the pipeline — IBM's Personal System/2, machines based on the Intel Corp. 80386 and the enhanced Apple Computer, Inc. Macintosh — the already hefty corporate investment in microcomputers is likely to skyrocket.

Because of the great investment in microcomputing, now is the time when microcomputer management needs the support of top management the most, says a senior manager in charge of microcomputer support at the New York office of a major financial services firm.

The manager figures it this way: A fully configured microcomputer costs between $3,000 and $4,000. Each computer is accompanied by $1,000 in software. So before the cost of training, maintenance and special overhead associated with microcomputers can even begin to be calculated, an organization is looking at an investment of $5,000 per machine. If an organization has 3,000 machines — typical for a major financial institution — then micros represent an investment of roughly $15 million.

The above calculations represent only the initial cost. In a period of three years, a personal computer will cost an organization $30,000, including the cost of hardware, software, support, maintenance and overhead, Atrium Information Group's Ross says. Is it any wonder that top management is suddenly very concerned about costs?

Simply not true

Part of top management's reluctance to spend money on PC support stems from numerous myths about microcomputing. The greatest myth promises that as the cost of hardware drops, the cost of training drops.

Leslie Fiering

"That simply is not true," says Leslie Fiering, manager of advanced technology at Banker's Trust Co. in New York. Nowadays, because micros are so inexpensive that they are routinely placed on the desks of less astute and less motivated employees, the need — and cost — for support and management control has increased dramatically.

Micro managers are trying to shoot down the falling-cost-of-support myth. According to Franz Sainte, second vice-president of office integration at New York's Chase Manhattan Bank N. A., the truth is that the cost of the latest microcomputer hardware is dropping only in the sense that more computer power can be had for less money than it would have cost in the past.

But, he says, it takes more support, even of the so-called "power users," to harness the advanced capabilities and new microcomputer horsepower.

Management falls prey to other myths as well. For example, despite what vendors promise, computers are not becoming intuitively simple to use.

With the development of micro-to-host communications, local-area networks and multiuser microcomputing, the machines have become more sophisticated and more complicated. Management has yet to come to grips with the power and complexity of microcomputers, according to Sainte.

"At the beginning, management had no idea what [microcomputers] were about," he says. "They thought they were for games." When top managers realized the newly powerful PCs could be a valuable business tool, Sainte says, they changed their minds. "But now management thinks computers are easy to use," he says.

The machines will be as intuitively simple to use as a telephone or a copier only when the machines perform just one task, micro managers argue. But in the corporate environment, microcomputers are used for many different applications, and new uses are constantly being created. "The new products are not easier to use," Ross says. "With multitasking and networking, there are simply more things to go wrong."

Stagnation without support

Another myth is that end users, once trained in the basics, will develop further on their own. "The computer gurus need freedom and will help themselves, but most people will rise only to the minimum level it takes to do their job," says Alex Kask, senior manager of the computer audit department at New York-based Ernst & Whinney.

Without microcomputer support to help move end users beyond a minimum

competence level, an organization's investment in microcomputer technology can be wasted. For instance, Kask says, "Most people do not use the full power of Lotus."

Kask tries to team up experienced power users with inexperienced users for peer-level training and support, but he notes that this approach is not a panacea for the problem of micro support.

Another myth is that the issue of support will go away by itself in a few years because the current generation of students, familiar with computers, will not need help. But in fact, Kask says, "We're not comfortable with college-trained computer users." His experience has been that most recent college graduates lack basic computing skills and consequently need as much support as any other novice.

No happy ending here

Indicative of the battle micro managers must fight is one manager's experience at a firm where she used to work. Top management at this company unquestioningly embraced all the myths of microcomputer support.

> "SUPPORT groups are the first things to go when times are bad."
>
> VIRGINIA TALAMO
> COOPERS & LYBRAND

Support for micros looked good on the surface. The company established an in-house computer store that also served as an information support center. It was responsible for acquisition, system integration, hot-line support and maintenance. It also took over the purchasing process.

But the company severely underfunded the operation so that there was little staff, the former manager reports. Optimally, micro managers suggest that a support group be staffed at the ratio of one support person for every 250 users.

"We had one person for every 400 users. We couldn't handle all the work," she says.

The support group was put in an impossible situation. "The end users were angry because they didn't get service," she says. Management was angry because it felt it was paying too much. "They were convinced that they could buy support [from outside vendors] in the market for much less," she claims.

After unsuccessfully trying to change management's attitude, she left. Shortly after her departure, management eliminated the support group altogether. The company hired an outside firm to handle acquisition and end-user support.

Immediately, hardware costs jumped 15% compared with what the in-house support group had paid. In addition, the company's purchasing department had to hire more people to handle the microcomputer purchasing that the in-house group had previously handled.

Support costs, mainly training, doubled, and the company lost its hot-line support altogether. It also lost the system integration, research and strategic planning functions that had been handled by the in-house group.

Less than one year later, the company is reestablishing the in-house group but still has not fully learned the lesson. "They are trying to do it with exactly the same staff as before. But now they have many more machines and users," reports the former manager, who maintains private contact with some of her former colleagues.

Ironically, the company's negative attitude about micro management was caused in part by its early progressive attitude toward microcomputers. "They were one of the first to establish a personal computer store, which was held up as a model," she says. "They never experienced the pain" that many companies run up against when they try to standardize and integrate microcomputers into the organization. As a result, the company never appreciated the value of its support team.

Micro managers agree that micro support groups are highly vulnerable to cost-cutting initiatives by a management team that often views them as a costly amenity rather than as providers of a valuable business function.

"Support groups are the first things to go when times are bad," Coopers & Lybrand's Talamo notes.

Beyond the hot line

Like their MIS counterparts before them, microcomputer managers are increasingly shaping their departments to become integral to the organization's business.

"We're concentrating support in each department, evolving to a vertical market type of support, like MIS, which puts its people out with the users," Talamo says.

Micro managers must move beyond thinking only in terms of installation and hot-line support, Banker's Trust's Fiering warns. Otherwise, management will invariably turn to vendors for installation and will rely on experienced end users to help the novices.

Talamo enjoys increased support from top management because she has shown "how micro technology management pays off for the business itself," she says. She has transformed her department from a support function for end users to a technology planning group.

She convinced management that end users were not using the company's 600 microcomputers as effectively as they could be. She also showed management how she could support end users and

serve a profitable business function.

To make this kind of transformation successfully, many micro managers will need to change. Their departments, while maintaining ongoing basic training and support for computer novices, will have to become involved in the actual business of the organization and show how desktop technology can be applied to achieve better productivity.

Micro managers must become technologists rather than hand-holders, Fiering says. They must understand the business and be ready to apply their knowledge and skills to solving business problems rather than showing users which buttons to push. For instance, they must be able to envision how a specific business problem can be better analyzed using an advanced spreadsheet technique.

These managers must also become involved in strategic planning, Fiering says. They must understand issues such as compatibility, networking and multitasking and must anticipate how these issues will affect the organization's computer use. Finally, they must be able to make the technology work smoothly.

Micro managers also argue their cases on the basis of a cost comparison with the organization's mainframe computers. "The new micros have almost the same power as many mainframes, and it takes 10 people to support each mainframe, while a micro is supported by one person at a workstation," Sainte says.

Other managers shy away from pushing the mainframe cost comparison too far. "Micros are the low man on the totem pole in the budget battle. The PC budget might be $500,000 while the mainframe budget is millions," Fiering says.

Beefing up

Not all organizations are cutting back on micro support. For instance, Eliot Bank, a small Boston bank, recently went through a major restructuring that included a revamping of its computer systems, says Daniel Beckman, systems manager. Beckman was brought to Eliot last May.

Until this past year, the bank had no more than half a dozen personal computers, he estimates. Since then, the number of PCs in use has jumped to more than 50. Although the bank has traditionally "not been system-heavy," preferring to rely on outside support, Beckman says, it realized it needed to support the micro end users in-house.

To provide that support, Beckman is hiring a full-time person. Management is not griping about the need for or cost of support, and Beckman did not have to go through a formal cost analysis.

"Our top executives have PCs on their desks," Beckman says, which invariably makes them more supportive.

The involvement of top management is key to the level of support micro managers receive. For instance, with the blessing of the Boston general managing partner, Laventhol & Horwath's Computer Application Services in Boston has two full-time people reporting directly to Sneider, who is in the process of adding two more people. In addition, Sneider recently received a budget authorization to spend more than $120,000 for the purchase of new, fully configured 80386 machines. The department already supports 90 micros.

Microcomputers were not always as well managed at Laventhol. "It was easy at the beginning because just a few of us were experimenting with Apple II and Visicalc," Sneider recalls. As the machines became popular, "things got difficult. Too many people were experimenting to too great an excess," he says. The result was "we lost a lot of productivity," he notes.

Sneider realized that the machines had to be managed, supported and controlled. "There was more hardware, more software. It was getting very difficult for the users. We realized we had to make the operation of the machines transparent so that the users could concentrate on their work," he says. With the full support of the managing general partner, Sneider created the Computer Application Services group.

The Boston office is ahead of other offices in developing that kind of microcomputer productivity. "You need a managing partner with some enthusiasm for computers," Sneider says. "It really takes some evangelism."

Support and more

If micro managers are to maintain their independence and if their departments are to grow, they will need top management support, and more. They will have to balance the need to support novice users with the advanced demands being made by experienced end users.

Micro managers will have to communicate a strategy for how their organization is going to productively implement the latest microcomputer advances and help end users take full advantage of the sophisticated technology.

These managers will also have to show how their technology advances the organization's own strategic objectives, and they will have to defend themselves from any designs by MIS to reassert control.

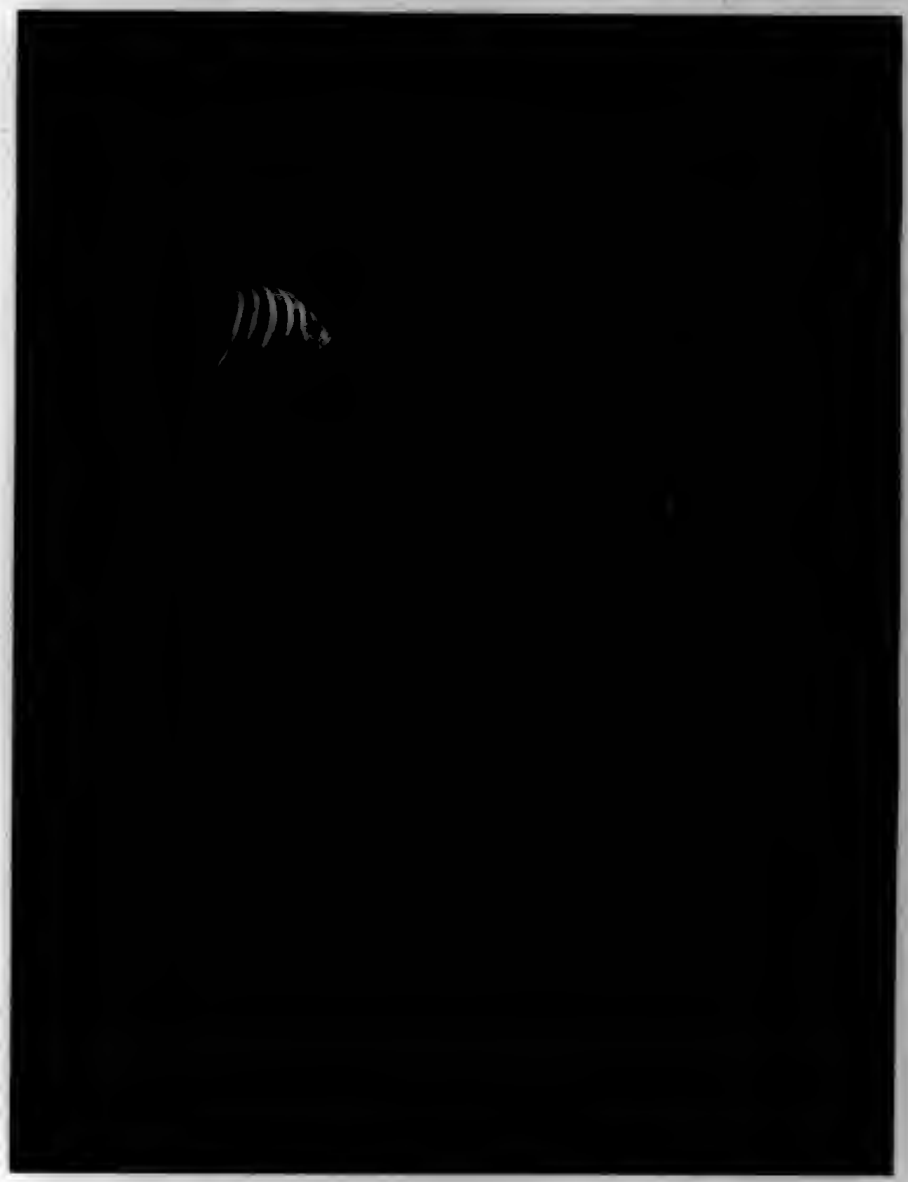
In the end, the nature of end user computing itself will throw the weight of the organization behind micro management. "Why is there end-user computing at all?" Ross asks.

"It is the technology that makes end-user computing possible," he answers. "The business climate is changing so fast that the end user can't wait for MIS to implement a particular solution. He needs fast turnaround. He needs to do it himself. But the average end user isn't a systems professional. He will always need guidance." •

COMPUTERWORLD

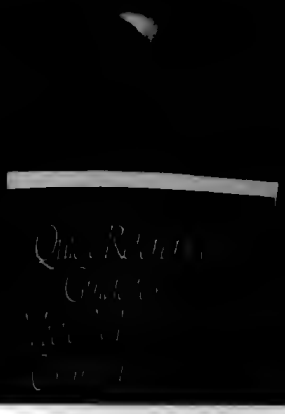
SPOTLIGHT

TERMINALS AND TERMINAL EMULATION



It may not be enough anymore to just act like a terminal. PC traits are showing up in terminals, and emulation products are gaining new stripes.

EXTRA HELP



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While conventional terminals battle each other for market share, a new type is challenging PC encroachment

PCs TRIGGER NEW RESPONSE

BY LAURA DIDIO

KAREN STOLPER

The terminal market may have reached maturity, but no one could call it staid or dull. Display terminal vendors are brawling with personal computer makers that have invaded their turf. The air in the overpopulated ASCII/ANSI sector is thick with rumors of mergers, acquisitions and Chapter 11s. Analysts and terminal manufacturers alike predict skirmishes over features and performance, particularly in the beleaguered ASCII/ANSI territory. The most convincing evidence of continued vitality, however, is the emergence of a new species that combines the advantages of both the terminal and the PC and thrives in a local-area network environment.

At this point, "processing terminal" is the most common of several names used to refer to this new breed. The devices are also called "diskless PCs" and "intelligent workstations." As implied by the confusion over nomenclature, this recent entry is not yet fully understood or appreciated.

Market researchers cannot agree on a common name or definition for this type of terminal. Dataquest, Inc. in San Jose, Calif., defines a processing terminal as a product capable of local processing through the use of a microprocessor that is part of the basic product. Processing terminals or diskless PCs provide no removable data storage media and must communicate with a server, controller or computer in which data files are retained.

"It is not a display terminal, because it has local processing power," says Glen Schiller, an industry analyst for the Display Terminal Industry Service at Dataquest. And it is not a personal computer, he adds, because it does not have removable data storage.

International Data Corp. (IDC) in Framingham, Mass., on the other hand, speaks in terms of diskless PCs that have memory capable of running DOS locally and can be connected to any standard LAN.

Analysts agree, however, that the new technology has a promising future.

"Right now, processing terminals or diskless workstations are an embryonic segment of the market," says Greg Blatnick, director of Dataquest's Display Terminal Industry Service. Dataquest estimates that processing terminal shipments, which amounted to only 10,000 units in the first half of 1987, will rise to 85,000 units this year and 200,000 units by 1991.

Eileen O'Brien, a senior research analyst at IDC, says she foresees a time when intelligent workstations, with or without disks, will be the workstations of choice.

How quickly this happens, O'Brien adds, depends to a large extent on progress in the installation of LANs. "The ability to access and use the storage and printing facilities of other systems that are on the network will be an important consideration in determining how many workstations are sold," she says.

"One of the real attractions of a LAN terminal is the ability to bundle it into a LAN connection. It's an easy way to grow your connections on the channel," says Ilene Goldman, an analyst at Smith Barney, Harris Upham & Co. in New York.

Processing terminals will appeal most to

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organizations that utilize a LAN but do not want to invest in PCs that require interface boards, Blatnick says. These users do not need the disk drive, storage or high cost associated with buying lots of PCs. They do want the ease of use and security that diskless workstations afford.

Financial institutions and insurance companies would be obvious possibilities, Blatnick notes. Other likely prospects include airline reservation and scheduling systems, medical and health care services and the publishing industry.

Processing terminals are not currently a bargain purchase. Only a few product offerings are priced competitively with PCs and display terminals.

Novell, Inc., its subsidiary Santa Clara Systems, Inc. and Hyundai Electronics Industries Co. are, however, involved in a joint venture to develop what they claim is "the industry's lowest cost-per-node diskless personal computer." The device, called PCterminal, is a fully IBM Personal Computer-compatible diskless desktop workstation featuring a built-in Intel Corp. 8088-based network connection based on a high-speed Ethernet interface and a $699 price tag.

The LAN edge

Goldman and other analysts say that LAN companies such as Novell, 3Com Corp. and Banyan Systems, Inc. currently have an edge over terminal makers.

"We've only seen a few diskless workstation offerings from the terminal makers," Goldman says. "They're still a little costly to produce. The manufacturers who will get a head start will be communications firms, like Novell, that have hardware vendors as subsidiaries."

NCR Corp. is one of the biggest players in the processing terminal market. Its latest offering, the NCR 3392, can function as a processing terminal, a PC or a network server, depending on optional hardware additions.

NCR's prospects in the processing terminal market look good. E. F. Hutton & Co. has said it will purchase 10,000 NCR 3390 processing terminals to be installed worldwide during an 18-month period. Additionally, NCR — through its Hauppauge, N.Y., subsidiary Applied Digital Data Systems Corp. (ADDS) — will have the manufacturing strength to fulfill forthcoming product demand.

The Lynk Corp.'s Computinglynk1, which debuted last March, is the only processing terminal on the market for IBM System/36 and 38 users. Like other processing terminals, Computinglynk1 can be upgraded to a full-function PC. Unlike other terminals, however, this one is upgraded by adding an external unit to the basic product.

The most notable processing terminal offerings from terminal vendors come from Televideo Systems, Inc. and Telex Computer Products, Inc.

Televideo's director of terminal marketing, Tim Meadows, says that although LAN companies now have the advantage, "in the long term, the terminal vendors have the edge from the price point and economies of scale in manufacturing."

But the real winners, Meadows says, will be vendors like Televideo and Wyse Technology, which address both the PC and the terminal markets.

Televideo's processing terminals use standard Intel processors. Its Networkstation/286 uses an Intel 80286 processor and features IBM PC AT and network compatibility. The Telex 1220 looks like and can be converted to a full-function PC.

PROCESSING terminals are not currently a bargain purchase. Only a few product offerings are priced competitively with PCs and display terminals.

Wyse's subsidiary Link Technologies, Inc. offers four processing terminal products. Among them is PC Term, a multiuser terminal for IBM PCs. Wyse itself plans to introduce a processing terminal product this year, as do Esprit Systems, Inc. and AT&T.

As the market for this type of terminal develops, Dataquest's Schiller predicts that graphics will become more sophisticated and the need for connectivity techniques more pronounced. "Processing terminals must provide and support one or more LAN protocols until LAN standards are established," he notes.

While the market for processing terminals or diskless workstations is not yet big enough to have affected sales of terminal emulation software, vendors of those products are watching this market's development closely and are adjusting their business plans accordingly.

"We have to begin making a plan of action [to address the diskless PC market] within the next six months, because it's been a constant background request from our end users," says Sandi Ptiach, terminal communications product manager at Persoft, Inc. in Madison, Wis.

The real issue for Persoft is that users will be getting their information from a file server and not a hard disk. Currently, the company does not support this method of use.

Eugene Buechele, vice-president of engineering at Communications Solutions, Inc., a 6-year-old supplier of terminal emulation software in San Jose, says he expects the burgeoning diskless workstation market to spur his firm's sales.

"We're just now seeing the demand for processing terminals catch up with dumb terminals," Buechele says. It is a development that makes sense, he says, especially in terms of controlling telecommunications costs. "MIS managers are finding that their largest expenditures to control are telecommunications costs. One means of controlling costs is to do the majority of the data processing at the workstation."

Among the elders

Excitement in the fully grown terminal sectors is the result mainly of rivalry and the fight for survival. The IBM 3270 and System/36 and 38 environments have reached maturity, as has the ASCII/ANSI arena. That means slowed, although not declining, sales.

The 3270 side has already experienced shakeouts. IDC estimates that IBM has captured nearly 53% of the market, followed by Telex, with a little less than 17%. The next nearest competitors are Courier Information Systems, with just less than 9%; AT&T, with 7%; Lee Data Corp., with 4%; and Harris Corp., with about 3%. That leaves only a few percentage points for also-rans.

According to IDC, domestic 3270 unit terminal shipments were down 7% last year, with an 11% dollar value decline. Although analysts had anticipated a slowdown in the 15-year-old market, they had not expected to see a decline in unit shipments until the end of the decade.

The decline is attributable to several factors, according to Smith Barney's Goldman. One is a decline in mainframe shipments, which eventually influences the sale of 3270 controllers, terminals and printers. Another is the near saturation of batch to on-line systems. In addition, Goldman notes, the closing of the price gap between PCs and terminals has, in many instances, made 3270s "redundant."

Despite market forecasts for flattened growth in the terminal business, IBM continues to see plenty of opportunity. The company has completely overhauled the 3270 product line in the last year. Don Casey, vice-president of hardware development in IBM's Communication Products Division, says the firm is bullish on the future of display terminals. "Clearly, customers are buying both PCs and terminals," he says. "But I haven't yet seen PCs cutting into our terminal sales."

IBM's approach with its 3190

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New strategies for life after boards

BY LESLIE LORD

The market for IBM 3270 terminal emulation products has changed dramatically in the past 18 months.

A number of PC-to-mainframe connectivity options have been blessed by IBM. Under the Systems Application Architecture (SAA) umbrella, OS/2 and the Personal System/2 are the newest introductions to the IBM connectivity strategy. But products that support 3270, LU6.2, distribution function terminal (DFT), Synchronous Data Link Control (SDLC), asynchronous and IBM Token-Ring connections have also been deemed "strategic."

At the same time, third-party vendors of PC-to-mainframe communications products have begun to move beyond board-level terminal emulation to plot long-term strategies for software-based communications capable of outperforming solutions architected by IBM.

Software portage

Although IBM's OS/2 Standard Edition only shipped in December, PC-to-mainframe communications vendors have already begun to port their existing terminal emulation software to the operating system and to design IBM Micro Channel versions of their own emulation boards. For the average terminal emulation user who decides to install OS/2, this means being able to run a program such as Digital Communications Associates, Inc.'s Irma E78 Plus as a task under OS/2 with the same look and feel as it has under Microsoft Corp.'s MS-DOS.

IBM has also announced the future availability of OS/2 Extended Edition, which it says will include embedded support for a wide range of terminal emulations, communications protocols and links and programming interfaces via the OS/2 Extended Communications Manager, as well as access to file transfer, application programming interfaces and system management utilities.

Using IBM's favorite example, a PC user on the Token-Ring could use the Communications Manager to access a 3270 session with an IBM mainframe, an LU6.2 session with another PC on the local-area network and an asynchronous connection with a public data base. Instead of using several different communications adapters and software programs, all that would be needed to accomplish these tasks, either serially or simultaneously, would be OS/2 Extended (or OS/2 Standard and a third-party Communications Manager) and a connection to the Token-Ring.

Not an easy task

Implementing an independent OS/2-compatible Communications Manager engine is no small task, even for veterans of the terminal emulation business. In drastically simplified terms, software development of this nature would involve at least the following basic steps:

- Combining all existing IBM 3270, 3101 and Digital Equipment Corp. VT100 terminal emulation code.
- Adding support for DFT, SDLC, Token-Ring, PC Net, CCITT X.25 and asynchronous links under LU6.2, 3270 and asynchronous protocols.
- Reworking the combination to run on the OS/2 platform.

Beyond that, anyone aspiring to be one release ahead of IBM will also want to add a windowing and graphics interface that conforms to SAA rules.

Still, the potential rewards for this labor promise to be more than commensurate. There is little doubt that many Fortune 1,000 companies will eventually migrate to OS/2 or that a significant number will opt to buy third-party solutions if they are available and offer added value.

The only real question is the extent to which the Communications Manager relies on the Token-Ring as backbone transport. If IBM is betting everything on the Token-Ring, demand for the Communications Manager will not be as quick to take effect.

Given the availability of functional PC-to-mainframe products based on the MS-DOS platform, end users can take their time formulating an OS/2 migration strategy. And, because PC-to-mainframe vendors are making such industrious use of the interval, they can do so in full confidence that when the time comes to move, an ample number of value-added alternatives will be available.

If and when companies standardize on OS/2 Extended Communications Manager as their link to the mainframe, PC-to-mainframe vendors that are serious about staying competitive will have made the transition from providing hardware links to being communications software specialists. ●

Lord is a senior research analyst in the Workstation Market Program at International Data Corp.

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family diminishes the benefit that other vendors might have derived from a second wind, Goldman observes. Considering the average life of a 3270 device ranges from five to seven years, she estimates "we should soon begin to see replacement turnover become a larger factor."

Vendors of 3270-type terminals will not be able to take full advantage of that windfall, however. After systematically chopping prices for the past two years, IBM has now triggered a round of price cutting more drastic than any in recent years.

Volume discounting has reached a fever pitch, observes Goldman, who says IBM is widely believed to be discounting by as much as 45% to 60% on high-volume orders. IBM is hardly unique in this respect, though, she points out. "In a bid situation, the majority of 3270 manufacturers will undercut even their own volume-discount schedules to win contracts."

Eventually, she says, such actions will result in "extreme consolidation in the marketplace."

That consolidation has already begun. Telex, faced with the prospect of a hostile takeover by arbitrageur Asher Edelman last October, began shopping for a suitable partner, which it found two months later. As of this writing, Telex, with $900 million in annual revenue, and Memorex Corp., which recorded sales of more than $1 billion last year, are set to merge.

According to Brian Shemilt, Telex's vice-president of corporate marketing, the merger will result in an entity that owns more than a 20% share of the global terminal market and about 25% of the U.S. market.

Land of giants

Playing in the ASCII/ANSI market has also become a high-stakes game. Although more than 30 vendors make up the market, six or seven players account for 80% of all shipments. "If you aren't doing a run rate of at least 100,000 terminals a year, you're not really competing," Datasquest's Blatnick says.

At the top of the heap is Wyse, which recently reinforced its already considerable strength with the acquisition of Link. Goldman estimates that with this addition, Wyse will be shipping five times as many terminals as its nearest competitor in the ASCII market.

Wyse's major challenge for the upcoming year is filling its huge order backlog.

Wyse WY-30, WY-50 and WY-60 terminals are so popular that distributors say customers are willing to wait months for one of the machines rather than settle for another brand.

Steve Holtzman, Wyse's vice-president and director of product marketing, says Wyse will whittle away at the order backlog with the expansion of its Taiwan facility and the addition of a new facility in Hong Kong.

Wyse's strong showing in the ASCII/ANSI market leaves the other big names, such as Televideo, Ampex Corp., Qume Corp., ADDS and Digital Equipment Corp., playing follow the leader.

Still, according to John Murphy, Ampex's national distribution manager, even runners-up can do well in this market. "Wyse outproduces us by a 2-to-1 margin, while DEC outpaces us by a 1.5-to-1 margin," Murphy says. "But we're pleased with business."

Price wars

Murphy predicts that in 1988 the terminal market will see a trend toward higher performance terminals with the same or slightly higher prices as older models.

"The Taiwanese dollar has been devalued against the U.S. dollar, causing vendors to experience increased pressure on factory margins," he says. "As a result, users won't enjoy the severe retail price erosion they saw two years ago."

Still, Murphy concedes that low-end PC clones are bringing pressure to bear on the terminal market as their prices approach those of high-end terminals.

"This," he says, "has created the gray area of the processing terminal."

It is not just prices but also expectations that have been influenced by PCs, according to Gordon Hope, director of marketing for ADDS. Buyers are now asking for more graphics and more functionality in general. "Today," he says, "PCs are defining what is expected from display terminals or workstations."

And then there's the matter of DEC's VT320. While the company's competitors are happy the device is a "me-too" product, they are distinctly dismayed by its $545 list price — the lowest on the market — which is bound to cause a price war.

"DEC has done a pretty effective job in displacing IBM in the computing arena, but while it was busy with the VAXs, Ampex, Wyse and CIE took a lot of its terminal business away," Murphy says. With the debut of the VT320, "the competition really begins."

CIE Terminals, Inc.'s product marketing manager, Allen Gronsky, offers another perspective on the VT320. "DEC has been an umbrella holder," he says. "With the VT320, they decided to play hardball on pricing. But it's a me-too product."

CIE, which competes mainly in the DEC ANSI market, is shopping for niche markets, according to Don Hazelton, the company's vice-president of marketing for terminals and printers. That doesn't mean CIE has given up on head-to-head competition with DEC, however. Hazelton says the company's new products for the coming year may include VT320, VT330 and VT340 clones.

Other ASCII/ANSI vendors worth watching include Falco Data Products, Inc., Esprit and AT&T, which is a dark horse in the competition.

"AT&T gets ignored in the terminal market, but they're making some very interesting and innovative products," Datasquest's Blatnick says.

AT&T's product marketing manager, Jack Deneberg, acknowledges that his firm's primary focus in the past has been on its own systems. "Now, however, we anticipate more activity in the non-AT&T market and with Unix-based display terminals," he says.

AT&T's strategy, Deneberg says, will be to provide an Intel 80386-based computer running the Unix operating system within a terminal.

Melville, N.Y.-based Esprit, meanwhile, saw sales for its first fiscal quarter of 1988 rise by some 72%, "mainly due to our Express Service and Opus line of ASCII terminals that emulate the Wyse WY-50 and the Opus 4," says product marketing manager Sal Lanuto.

Falco Data Products, which separated itself from the crowd with its Falco 5220, plans to offer a combination of standard terminals in conjunction with peripheral products and multitasking machines for niche markets.

"There's no doubt that the life of a terminal-only supplier is limited," says Don Staub, vice-president of marketing sales. "But we've specifically elected to stay out of the PC business. It's not a high-margin business. We want to deal with VARs and large OEM users."

Market predictions tend to confirm the wisdom of diversification. According to IDC, the modest comeback that the ASCII/ANSI market experienced in 1986 will not last. IDC forecasts that the 9.5% growth rate will taper off, producing a compound annual growth rate in the neighborhood of 5%. •

Emerging hybrid

Processing terminals break new ground in terminal market, with biggest push coming from local-area network vendors*

*Terminals that use a microprocessor for local processing, communicate with a data source and have no removable storage media

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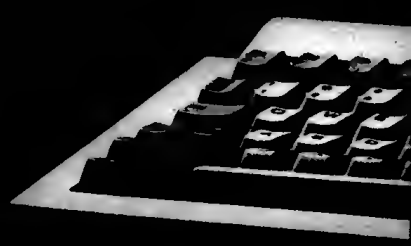

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Opting for imitation

BY G. BERTON LATAMORE

Designers and engineers are choosing imitations over the real thing. They are opting for personal computers equipped with software that emulates graphics terminals instead of investing in specialized equipment.

There are several reasons for the shift, says Charles Foundyller, president of Daratech, Inc. in Cambridge, Mass. For one thing, he notes, PCs have made great strides in the last two years in providing graphics capabilities and general computing power. In addition, emulation-equipped PCs are much less expensive than graphics terminals. IBM 5080s sell for $15,000 to $50,000, depending on their configuration. A PC, however, might cost $2,000 to $5,000 and the emulation software less than $1,000.

Convenience is also an issue, according to Foundyller. "PCs are typically the property of individuals with limited desk space who often need to access and review data on various larger systems. The alternative to emulation for these people is to maintain individual terminals for each system in their vicinity, a solution that is expensive and clumsy."

Space-saving

Space conservation is a compelling argument for graphics terminal emulation, as far as Tom Korany, a computer programmer in the Electrical and Electronics Division of Ford Motor Co. in Dearborn, Mich., is concerned. According to Korany, Ford engineers, like the rest of company personnel, will be equipped with IBM Personal System/2s for routine business tasks in the next five years.

"Why," he asks, "should we force them to go to another terminal for design work or have two boxes on their desks?"

Still, there is on denying that differences exist between a full-fledged graphics terminal and a PC playing the role, Foundyller says. A PC's color range and resolution are more restricted; for that reason, emulation generally works best for prep work and visual reference.

Most of the work done at the U.S. Geological Survey (USGS) office in Vancouver, Wash., falls into this category, according to the office's data processing site manager, Ed Brown. Brown's shop runs about 35 IBM Personal Computer ATs running PC4010, a Tektronix, Inc. terminal emulation software package from General Micro Systems in Hopkins, Minn.

The emulation software is used in conjunction with graphics packages on Digital Equipment Corp. and Prime Computer, Inc. systems and for generic communications with IBM mainframes. Brown, the USGS's DP site manager, explains that while the Vancouver office still uses Tektronix terminals for tasks that require high resolution or multiple colors, it has shifted to terminal emulation for the bulk of its work. The PC approach is less expensive and allows users to take advantage of the abilities of the PC, he says.

Graphics terminal emulation makes sense for Victor Urbach, a mechanical engineer with Computer-Aided Engineering Associates in Woodbury, Conn. Urbach says he works out of his home most of the time, using dial-up connections to company computers, and cannot readily access a terminal. He says he also prefers to keep available all the abilities of a PC, such as local file storage.

Urbach runs the EM4010 and EM4105 graphics terminal emulation packages from Boulder, Colo.-based Diversified Computer System on what he describes as a generic IBM PC AT clone at his home in Westbury, N.Y. "We do more analysis than design," he says. There are, he explains, three phases to finite element analysis: preprocessing, in which a model is built; the solution phase, which entails number crunching; and postprocessing, the engineer's inspection and interpretation of the analysis.

"Typically, I would use Ansys-PC/Solid, a solid model subset of Ansys [from Swanson Analysis Systems, Inc. in Houston, Pa.], to create a finite-element model on the PC. Then I send the files to the mainframe, run the heavy number crunching — the solution phase — then use the terminal emulator graphics to study the postprocessing file. I can also treat the PC as a terminal the whole way. In other words, I log on to the mainframe and do all my work interactively."

> A PC's color range and resolution are more restricted; for that reason, emulation generally works best for prep work and visual reference.

Quick draw

At General Electric Co.'a Aircraft Engine Division in Cincinnati, the impetus for emulation is designer productivity. Carl Lawrence-Slater, a GE engineer and computer consultant, says, "If I'm on a Vaxcluster, it may take me a half hour to generate the picture on the screen. Then I zoom in on a detail, and that may take another half hour to generate.

"With Emu-Tek [a graphics terminal emulation package from FTG Data Systems in Stanton, Calif.], I capture the plot," he continues. "Then I sign off the VAX, redefine my windows and zoom in. It takes only a few seconds to generate. That's really handy when five engineers are sitting around waiting for the screen so they can get some work done."

Besides running more than 120 VAXs, the GE facility uses a Cray Research, Inc. Cray X-MP/28, several IBM 3090s and 3084s and Honeywell Bull, Inc. DPS 90s and DPS 80s. Before turning to graphics terminal emulation, GE used Tektronix terminals. Today, the hardware population is split about 50-50 between monochrome terminals and PCs equipped with terminal emulation.

"You can do things with Emu-Tek that you can't do with the terminal," Lawrence-Slater says. "Right now, if I give my people the option of a PS/2 Model 50 or a Tektronix terminal, they almost always choose the PC." •

Latamore is a Burlington, Vt.-based free-lance writer.

IBM's DFT: Will it prove a beacon or a flash?

BY STEVE JACKOWSKI

Since its introduction in 1972, the IBM 3270 line of controllers and displays has set an industry standard. An estimated three million 3270-type devices are onw installed, of which IBM products represent only 50%.

The trend toward use of personal computers, once thought to signal the end of the 3270 market, has in fact expanded it. By 1985, Digital Communications Associates, Inc. (DCA) shipped more than one million of its Irma 3278 coaxial connection cards for IBM Personal Computers. DCA is now joined by others, such as CXI, Inc., AST Research, Inc., Emulex-Persyst, Inc. and Network Software Associates (NSA), as well as IBM itself.

As 3278 terminal emulation products proliferate, vendors seek methods to differentiate their products. Many provide host file transfer capabilities for PCs. A few actually permit multiple concurrent sessions. This is accomplished by a now highly regarded protocol used between a 3274 controller and the IBM 3290 display system called a distributed function terminal (DFT). IBM developed the 3290 to handle four simultaneous 3270 SNA sessions; DFT permits use of five.

The CUT factor

Original versions of the 3270 control units made use of a limited protocol called control unit terminal (CUT). IBM's 3270 CUT devices rely on the communications controller to perform all communications and display functions for them. DFT assumes the device is intelligent and is capable of handling SNA frames. As such, terminal emulators that support DFT can handle multiple sessions and different types of SNA sessions.

SNA PU2.1 support, which can eliminate the master-slave connections required by PU2, is the cornerstone of IBM's future networking strategy. It moves SNA networks away from their original restrictive and hierarchical structure toward distributed networks that will easily support peer communications via LU6.2.

Considering IBM's move toward outward distribution of intelligence in its networks and support of peer-to-peer connections via PU2.1 and LU6.2, several industry analysts hail DFT as the way, the truth and the light in 3270 terminal emulation. They have challenged the producers of terminal emulation products to confront the future through support of DFT.

While it is impossible to deny the advantages of DFT and while IBM may have indicated a strategic direction in announcing DFT support for OS/2 Extended Edition's 3278 coaxial terminal emulation, potential emulation developers and purchasers should at least consider the other side. DFT may have been developed solely as an interim measure and may well experience a short life cycle.

When IBM introduced the 3290, many customers had multiple terminals to display information from various network management facilities. The 3290 was introduced specifically to permit consolidation of the devices into one single unit.

Now, with the introduction of Netview, which consolidates network management information through software, 3290s are disappearing. Thus, if DFT does survive, it will fall into the category of the 2780 and 3780 — devices that no longer exist but whose communications protocols became de facto standards.

Networking nightmare

DFT's support of multiple LU sessions, which is touted as a great advantage, may also he its single largest drawback. Network configuration management becomes a nightmare as each remote PC suddenly manifests itself to the host as up to five LUs.

In fact, in distributed environments where Systems Network Interconnection is used with IBM 3705 or 3725 front-end processors, a relatively small portion of the network can quickly reach the 256 LU limit of these processors.

> DFT MAY have been developed solely as an interim measure and may well experience a short life cycle.

As DFT devices are added to control units, performance degrades rapidly. The IBM 3270 and 3170 series communications controllers run out of buffer space, the number of real devices connected is quickly limited and execution of certain commands taxes both the controller and the emulated devices. As the DFT proponents suggest, LU6.2, which facilitates peer-to-peer communications, is IBM's chosen direction. But contrary to most industry analysts' opinions, multiple LU sessions through DFT are not a fundamental requirement. An often overlooked feature of LU6.2, called parallel sessions, will allow simultaneous program-to-program, file transfer and terminal communications on a single LU session.

Use of the parallel sessions feature results in a number of benefits. It relieves the controller's responsibility, reduces buffering and configuration requirements on controllers, front-end processors and hosts and optimizes performance in a multisession environment.

It is possible that DFT will he the basis for coaxial-based distributed processing. CUT could, however, work just as well and is probably a better conservative choice, given the uncertain future for coaxial.

While 3270-type devices and terminal emulstors will certainly survive into the 1990s, coaxial may not. The ubiquity of twisted-pair and its support by IBM and most local-area network vendors may very well spell the demise of coaxial. •

Jackowski is lead consultant for Synygy Communications, Inc. in San Francisco.

Display terminals

COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Altos Computer Systems, Inc. (408) 946-6700	Altos IV	WY-50, WY-100; Televideo 910+, 925	2,080 char.	1	14	Monochrome	1	32	—	Asynchronous	ANSI, ASCII	38.4K	Character, block	Information not provided
	Altos V	DEC VT100, VT220; Altos II	3,432 char.	2	14	Monochrome	2	15 - 32	Full and half duplex	Asynchronous, synchronous	ANSI	38.4K	Character, block	$580
	Altos III	DEC VT100; Televideo 910	2,432 char.	1	14	Monochrome	2	32	—	Asynchronous	ANSI, ASCII	19.2K	Character, block	Information not provided
Ampex Corp. (800) 921-0299 (800) 921-9479 (Calif.)	Ampex 232	IBM PC, Televideo 925	3,300 char.	1	14	Monochrome	1	12	Full and half duplex	Asynchronous	ASCII	38.4K	Block	$539-$559
	Ampex 270	WY-60, WY-50+; Lear Siegler ADM 5; Televideo 955, 950; ADDS Viewpoint A1, A2	9,440 char.	4	14	Monochrome	9	32	Full and half duplex	Asynchronous	ASCII	38.4K	Block	$599
	Ampex 210+	ADDS Regent 251, Regent 20; Viewpoint A1, A2; Hazeltine 1410, 1400, 1500; Lear Siegler ADM 5, 3A, 3A+; Qume 102; Televideo 910, 910+, 920, 912, 925	9,168 char.	1	14	Monochrome	1	14	Full and half duplex	Asynchronous	ASCII	19.2K	Block, line	$439
	Ampex 280	Wyse 350/30; Esprit III Color; ADDS Viewpoint Color A1, A2; Hazeltine 1500; Televideo 910, 920, 912, 924, 925, 950	3,168 char.	—	14	Color	—	32	Full and half duplex	Asynchronous	ASCII	38.4K	Block	$1,095
	Ampex 230+	ADDS Viewpoint A1, A2; Hazeltine 1500; Televideo 910, 920, 912, 924, 914, 925, 950; WY-50	3,168 char.	4	14	Monochrome	1	32	Full and half duplex	Asynchronous	ASCII	38.4K	Block, character	$529
	Ampex 220	DEC VT220, VT102, VT52	3,168 char.	1 - 4	14	Monochrome	1	15	Full duplex	Asynchronous	ANSI	19.2K	Block	$529
Ann Arbor Terminals, Inc. (313) 663-8000	Genie XL	DEC VT52, VT100	2,400 char.	2	15	Monochrome	Varies	32	Full and half duplex	Asynchronous	ANSI, ASCII	300 - 19.2K	Character, line, block, underline, bold	$1,395
	Ambassador XL	DEC VT52, VT100	4,000 char.	9	15	Monochrome	Varies	32	Full and half duplex	Asynchronous	ANSI, ASCII	300 - 19.2K	Character, line, block, underline, bold	$1,595
	Ambassador GXL	DEC VT52, VT100, Tektronix 4010, 4014	10,000 char.	2	15	Monochrome	Varies	32	Full and half duplex	Asynchronous	ANSI, ASCII	300 - 19.2K	Character, line, block, underline, bold	$3,000
	Guru XL	DEC VT52, VT100, Tektronix 4010, 4014	10,000 char.	2	15	Monochrome	Varies	32	Full and half duplex	Asynchronous	ANSI, ASCII	300 - 19.2K	Character, line, block, underline, bold	$2,395
	VXL	DEC VT52, VT100, Tektronix 4010, 4014	10,000 char.	2	15	Monochrome	Varies	32	Full and half duplex	Asynchronous	ANSI, ASCII	300 - 19.2K	Character, line, block, underline, bold	$2,795
Applied Digital Data Systems, Inc. (800) 231-5445 (516) 231-5400 (N.Y.)	ADDS 1010	ADDS Viewpoint Plus, A1, A2, 3A+; Lear Siegler ADM 3A	1,920 char.	1	14	Monochrome	1	9 - 12	Full and half duplex	Asynchronous	ASCII	19.2K	Character	$395
	ADDS 2020	ADDS Viewpoint A1, A2, Regent 40; Hazeltine 1500; Televideo 910, 920, 925; WY-50	3,432 char.	9	14	Monochrome	1	28 - 56	Full and half duplex	Asynchronous	ASCII	38.4K	Block, character, line	$695
	ADDS 3220	ADDS Viewpoint 122; DEC VT220, VT100, VT52; ANSI X.3.64	3,300 char.	1	14	Monochrome	1	22	Full and half duplex	Asynchronous	ANSI	19.2K	Character	$695
Atlantic Research Corp. Tempest Division (703) 471-8000	T8152	DEC VT220, VT100, VT52, VT100, VT201	80 col.	—	14	Monochrome	—	36	Full duplex	—	ASCII	300 - 38.4K	—	$2,400
AT&T (800) 247-1212	630 MTG	NA	1,920 char.	9	19	Monochrome	7	9	Full duplex	Asynchronous	ANSI	19.2K	Character	$2,595
	629 MTG	Tektronix 4014; CSS/CGI Graphics	1,920 char.	1	14	Monochrome	9	36	Full duplex	Asynchronous	ASCII, ANSI	19.2K	Character	$1,295
	915 MT	DEC VT220, VT100, VT52	1,920 char.	1	14	Monochrome	9	36	Full duplex	Asynchronous	ASCII, ANSI	19.2K	Character	$945
	910 BCT	DEC VT220, VT100, VT52	1,920 char.	1	14	Monochrome	—	16	Full duplex	Asynchronous	ANSI	19.2K	Character	$875
	605 BCT	NA	1,920 char.	1	14	Monochrome	1	36	Full duplex	Asynchronous	ANSI	38.4K	Character	$595
	620 MTG	Tektronix 4014; CSS/CGI Graphics	1,920 char.	1	14	Monochrome	9	36	Full duplex	Asynchronous	ASCII, ANSI	19.2K	Character	$1,395
Avalon International (801) 268-6000	1987	IBM 3178?	2,000 - 3,564 char.	NA	14	Color	7	24	NA	Coaxial A	SNA[1], bisynchronous	256K	NA	$1,995

[1]IBM Systems Network Architecture [2]Binary Synchronous Communications [3]Synchronous Data Link Control

Listings include only those products for which companies provided specific responses to questions.

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from the vendors.

COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Beehive International (801) 355-6000	191D	IBM 3191D	2,000 - 3,564 char.	NA	14	Monochrome	7	24	NA	Coaxial A	SNA, bisynchronous	256K	NA	$1,495
	191	IBM 3191	2,000 char.	NA	14	Monochrome	1	24	NA	Coaxial A	SNA, bisynchronous	256K	NA	$1,195
	191DP	IBM 3191DP	2,000 - 3,564 char.	NA	14	Monochrome	1	24	NA	Coaxial A	SNA, bisynchronous	256K	NA	$1,895
	192FR	IBM 3192F	2,000 - 3,564 char.	NA	14	Color	1	24	NA	Coaxial A	SNA, bisynchronous	256K	NA	$2,000
	191DR	IBM 3192D	2,000 - 3,564 char.	NA	14	Monochrome	1	24	NA	Coaxial A	SNA, bisynchronous	256K	NA	$1,895
Calcomp, Inc. (800) CAL-COMP	The Vistagraphic 4500MV	DEC VT100	1,280 x 96 char.	—	19	Color	—	—	—	—	ASCII	19.2K	—	$29,375
Cardinal Technologies, Inc. (800) 722-0084	The APT CP500	DEC VT52	2,000 char.	1	12	Monochrome	1	8	Full and half duplex	Asynchronous	ASCII	9.6K	Character	$328
Cecorp (800) 854-8861 (800) 645-9598 (Calif.)	CE 1	NCR 796-101, 7900 Model 1	3,168 char.	NA	14	Monochrome	NA	14	Full and half duplex	Asynchronous	ASCII	19.2K	Character	$410
	CE 3	NCR 796-301, 7900 Model 3	3,168 char.	NA	14	Monochrome	NA	64	Full and half duplex	Asynchronous	ASCII	19.2K	Line, page	$950
Cxi Corp. (310) 821-8822	EMP-SI	Unisys UTS (30, 30, 40, 60, 400); IBM 3270 with 3270 BSC	2,025 or 3,325 char.	9	14	Monochrome	4 (UTS), 1 (3270)	To 2,048 (UTS)	Full and half duplex	Synchronous	UTS, EBCDIC	19.2K	Block	$1,075
	MP-ID	IBM 3270 with 3270 BSC, DEC VT52, VT100, VT102, VT220	2,025 or 3,325 char.	1	14	Monochrome	1	To 2,048 (UTS)	Full and half duplex	Synchronous, asynchronous	EBCDIC, ASCII	19.2K	Block, character	$1,475
	MP-SI	Unisys UTS (30, 30, 40, 60, 400); IBM 3270 with 3270 BSC	2,025 or 3,325 char.	9	14	Monochrome	4 (UTS), 1 (3270)	To 2,048 (UTS)	Full and half duplex	Synchronous	UTS, EBCDIC	19.2K	Block	$1,475
	MP-3270	IBM 3270 with 3270 BSC	2,025 or 3,325 char.	1	14	Monochrome	1	To 2,048 (UTS)	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,125
	MP-UTS	Unisys UTS (30, 30, 40, 60, 400); Unisys 100, 200	2,025 or 3,325 char.	9	14	Monochrome	4	To 2,048 (UTS)	Full duplex	Synchronous	UTS	19.2K	Block	$995
	MP-SD	Unisys UTS (30, 30, 40, 60, 400); DEC VT52, VT100, VT102, VT220	2,025 or 3,325 char.	9	14	Monochrome	4 (UTS), 1 (3270)	To 2,048 (UTS)	Full and half duplex	Synchronous, asynchronous	ASCII, UTS	19.2K	Block, character	$1,475
CIE Terminals, Inc. (800) 854-3322	CIT 326	DEC VT220	1,920 char.	4	14	Monochrome	2	180	Full duplex	Asynchronous	ANSI	19.2K	—	$595
	CIT 101XL	DEC VT100; WY-50; Televideo 910, 920, 925	3,300 char.	4	14	Monochrome	1	19	Full duplex	Asynchronous	ASCII, ANSI	38.4K	—	$645
	CIE 50+	DEC VT100; WY-50; Televideo 910, 920, 925	3,300 char.	1	14	Monochrome	1	19	Full duplex	Asynchronous	ASCII, ANSI	38.4K	—	$595
Computer Communications, Inc. (213) 280-0161	6178 Display Station	IBM 3178	1,920 char.	2	12	Monochrome	1	24	Full duplex	Synchronous	EBCDIC	19.2K	Block	$995
Concerto, Inc. (613) 591-3700	9191	IBM 3191, 3279	1,920 - 3,564 char.	—	14	Monochrome	1	24	NA	NA	EBCDIC	NA	NA	$1,065
	6192C	IBM 3179-1, 3276, 3192	1,920 - 3,440 char.	NA	14	Color	7	24	NA	NA	EBCDIC	NA	NA	Not provided
	6192D	IBM 3180-1, 3278, 3192	1,920 - 3,564 char.	NA	15	Monochrome	7	24	NA	NA	EBCDIC	NA	NA	Not provided
	9191	IBM 3191	1,920 - 3,564 char.	NA	14	Monochrome	1	24	NA	NA	EBCDIC	NA	NA	Not provided
Courier Information Systems (800) 230-1400	9091	IBM 3191A, 3191B	1,980 char.	1	14	Monochrome	NA	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,395
	9096C	IBM 3192C	1,980 char.	1	14	Color	1	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,895
	9096D	IBM 3192D	1,980 - 3,564 char.	1,980 - 3,564 char.	14	Monochrome	1	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,795
	9010, 9012	IBM 3191, 3179	1,980 char.	1	14	Monochrome	8	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,695
	9016	IBM 3192C	1,980 char.	1	14	Color	2	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,895
	9030, 9032	IBM 3192D	1,980 - 3,564 char.	1,980 - 3,564 char.	15	Monochrome	2	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$1,895
	9036	IBM 3193D	1,920 - 2,000 char.	1,920 - 2,560 char.	14	Color	2	36	Full and half duplex	Synchronous	EBCDIC	19.2K	Block	$2,295
Cromemco, Inc. (415) 964-7400	C-20	IBM PC XT and compatibles	—	640K bytes	—	Monochrome	Software-dependent	—	Full duplex	Asynchronous	ASCII	To 19.2K	Character	$1,295 (with transmission control software)
	C-15	DEC VT100	1,920 - 6,336 char.	2	12	Monochrome	2	15	Full duplex	Asynchronous	ASCII	38.4K	Character	$795
Cumulus Technology (415) 969-8800	HCT	HP 2392A, 2394A; ANSI X.3.64	3,168 char.	8	15	Monochrome	—	8	Full and half duplex	Asynchronous	ANSI	—	Block	$795
Data General Corp. (617) 366-8911	D220	Proprietary	1,920 char.	1	12	Color	1	19	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$2,275
	D407C	Proprietary	1,944 char.	1	12	Color	24	19	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$3,175
	D214	DG Dasher; ANSI X.3.64	1,920 char.	—	12	Monochrome	None	15	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$795

COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Data General Corp. (217) 398-8911	D212	DG Dasher; ANSI X.3.64	1,920 char.	1	12	Monochrome	None	12	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$895
	D461	DG D400; ANSI X.3.64	1,944 char.	2	12	Monochrome	24	15	Full duplex	Asynchronous	ASCII	110 - 19.2K	Character	$1,495
	D411	DG D400; ANSI X.3.64	1,944 char.	2	12	Monochrome	24	12	Full duplex	Asynchronous	ASCII	110 - 19.2K	Character	$1,195
Datamaxx USA Corp. (904) 224-8213	DMX 1100	Unisys ET1100	2,000 char.	4K bytes	14	Monochrome	10	20	Full duplex	Asynchronous, synchronous	ASCII	19.2K	Block, character, line	$1,095
	EXT 1278	Unisys T27, IBM 3278	2,000 - 3,000 char.	17	14	Monochrome	17	40	Full duplex	Asynchronous, synchronous	ASCII	19.2K - 38.4K	Block, character, line	$2,495
	EXT 1260	Unisys T27, DEC VT100	2,000 - 3,000 char.	17	14	Monochrome	17	40	Full duplex	Asynchronous, synchronous	ASCII	19.2K - 38.4K	Block, character, line	$1,545
	EXT 1250	Unisys T27	2,000 - 3,000 char.	17	14	Monochrome	17	40	Full duplex	Asynchronous, synchronous	ASCII	19.2K - 38.4K	Block, character, line	$1,495
Datamedia Corp. (800) 343-6336	Colorscan/2	DEC VT241	4,488 char.	1	14	Color	1	12	Full and half duplex	Asynchronous, (synchronous optional)	ASCII, ANSI (EBCDIC optional)	38.4K	Character	$2,060
Datapoint Corp. (512) 699-7000	7352	Datapoint 8242, 8200, 8220	2,000 char.	NA	14	Monochrome	Software-dependent	21	NA	NA	NA	NA	NA	$1,495
	7351	Datapoint 8242, 8200, 8220	2,000 char.	NA	14	Monochrome	Software-dependent	21	Full duplex	Asynchronous	ASCII	To 34K	Character	$1,495
Datawatch Corp. (617) 893-6660	Datawatch 220 Tempest Terminal	DEC VT220	3,168 char.	—	14	Monochrome	—	12	Full duplex	—	ASCII	19.2K	Character	$2,395
	Datawatch 240 Tempest Terminal	DEC VT240	3,888 char.	—	14	Monochrome	—	15	Full duplex	—	ASCII	—	Character	$3,395
	Datawatch 241 Tempest Terminal	DEC VT241	—	—	14	Color	—	12	Full duplex	—	ASCII	19.2K	Character	$6,495
Devox Corp. (617) 667-4455	Series 4900, 5900	IBM PC, XT, AT and compatibles; DEC VT220, VT100	3,168 char.	256K bytes	12	Monochrome, color	Unlimited	168	Full duplex	Asynchronous, synchronous	ANSI, ASCII	400K	Character	$2,695, $2,995
Dubo Data Systems Corp. (301) 200-6400	DD220T Tempest Terminal	DEC VT220	1,920 char.	NA	14	Monochrome	2	18	Full duplex	Asynchronous	ASCII	38.4K	Character	$2,745
Digital Equipment Corp. (617) 493-5111	VT340	DEC VT52, VT100, VT241; Tektronix 4010, 4014	3,168 char.	6 (text), 2 (graphics)	13	Color	2	43	Full duplex	Asynchronous	ASCII, ANSI	19.2K	Block, character	$2,935
	VT330	DEC VT52, VT100, VT240; Tektronix 4010, 4014	3,168 char.	6 (text), 2 (graphics)	14	Monochrome	2	43	Full duplex	Asynchronous	ASCII, ANSI	19.2K	Block, character	$1,990
	VT320	DEC VT52, VT100, VT220	3,168 char.	1	14	Monochrome	1	43	Full duplex	Asynchronous	ASCII, ANSI	19.2K	Character	$545-$595
Direct Service & Repair (800) 888-1414	Direct 851	DEC VT100	24, 25, 26 lines	—	14	Monochrome	—	12	Full and half duplex	—	ANSI, ASCII	150 - 38.4K	Block, line, character	$1,195-$1,395
	825	HP 2622, 2645, 3000	1,680 char.	16K - 32K bytes	12	Monochrome	—	2	Full and half duplex	Asynchronous	ANSI	75 - 19.2K	Block, line	$1,195 (16K)
	820	HP 2622, 2645, 3000; DEC VT100, VT52	1,920 char.	32K bytes	12	Monochrome	—	2	Full and half duplex	Asynchronous	ANSI	19.2K	Block, line	$1,395
	DT9620	DEC VT220, VT100	3,300 char.	64K bytes	14	Monochrome	—	20	Full and half duplex	Asynchronous	ANSI	38.4K	Block, character	$995
	831	DEC VT52, VT100	3,300 char.	64K bytes	12	Monochrome	—	8	Full and half duplex	Asynchronous	ANSI	38.4K	Block, character	$1,195-$1,395
Electro Mechanical Systems, Inc. (217) 359-7125	Touch Information Display	Lear Siegler ADM-3A	1,920 char.	12	12	Monochrome	1	NA	Full and half duplex	Asynchronous	ASCII	300 - 19.2K	Character	$800
Epoch Systems, Inc. (818) 445-4888	Opus 220	DEC VT100, VT220	1,680 char.	2 standard, 4 optional	14	Monochrome	—	36	—	—	—	—	—	Not provided
	Opus 2	WY-50; Televideo 910, 950, 925; ADDS Viewpoint; Hazeltine 1500	3,402 char.	2 standard, 4 optional	14 (flat screen)	Monochrome	2	54 keys	Full and half duplex	Asynchronous	ASCII	To 38.4K	Block, line, character	$695
	Opus 4	WY-50; Televideo 910, 950; ADDS Viewpoint; Hazeltine 1500; Tektronix 4105; DEC VT52; Link PC Term	3,402 char.	2 standard, 4 optional	14 (flat screen)	Monochrome	Unlimited	54	Full and half duplex	Asynchronous	ASCII	To 38.4K	Block, line, character	$849
	Opus TCP 4	Same as Opus 4)	3,402 char.	2 standard, 4 optional	14 (flat screen)	Monochrome	Unlimited	48	Full and half duplex	Synchronous	ASCII	To 38.4K	Block, line, character	$949
	Opus 3971	Same Opus 4, plus DEC VT220, VT100, VT52)	3,402 char.	2 standard, 4 optional	14 (flat screen)	Monochrome	2	20 - 76	Full and half duplex	Asynchronous	ASCII, ANSI	To 38.4K	Block, line, character	$849
	LAN Term	MS-DOS 2.1 - 3.3	—	768K bytes	14	Monochrome	Unlimited	10	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K - 2.5M	—	$695
Falco Data Products, Inc. (800) 835-8765 (800) 538-5383 (Calif.)	Falco 5500	WY-50; Televideo 955, 950, 925, 920, 920; ADDS Viewpoint; Hazeltine 1500; Falco PC Term; Tektronix 4010, 4014; IVM 3101; DG 200	4,000 char.	4 - 7	14	Monochrome	6	12	—	Asynchronous	ASCII, ANSI	38.4K	—	Not provided

COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Pulse Data Products, Inc. (800) 262-8788 (800) 538-8388 (Calif.)	Pulse 3000	WY-50; Televideo 905, 906, 925, 950, 955; ADDS Viewpoint; Hazeltine 1500; Pulse PC Term; Tektronix 4014, 4014; IVM 3101; DG 200; DEC VT220, 132, 100, 52	4,000 char.	6 - 16	14	Monochrome	6	12 - 16	—	Asynchronous	ASCII, ANSI	38.4K	—	$795
	Pulse 3000E	DEC VT220, VT132, VT100, VT52	4,000 char.	4-7	14	Monochrome	6	16	—	Asynchronous	ASCII, ANSI	38.4K	—	$945
	Pulse 2000	—	4,000 char.	4-7	14	Monochrome	6	12	—	Asynchronous	ASCII	38.4K	—	$695
	Pulse 2000E	DEC VT220, VT100, VT201, VT52; ANSI X.3.64	4,000 char.	4-7	14	Monochrome	6	16	—	Synchronous	ANSI	38.4K	—	$695
Future International, Inc. (415) 453-3814	X92C	IBM 3192C	1,920 - 2,560 char.	5	14	Color	1	24	SDLC	Synchronous	IBM 3270	2.35M	Coxial A	Not provided
	X91/14	IBM 3191	1,920 - 2,560 char.	5	14	Monochrome	1	24	SDLC	Synchronous	IBM 3270	2.35M	Coxial A	Not provided
	X91/12	IBM 3191	1,920 char.	5	12	Monochrome	1	24	SDLC	Synchronous	IBM 3270	2.35M	Coxial A	Not provided
Gould, Inc. (Computer Systems Division) (305) 587-2900	Multiwriter; or Comrex Terminal	ANSI-compatible	—	NA	14	Monochrome	Software-dependent	20	Full and half duplex	Asynchronous	ASCII, ANSI, EBCDIC	19.2K	Character	$999
Hewlett-Packard Co. (800) 367-4772	HP 700/22	DEC VT220	1,920 or 3,168 char.	4	14	Monochrome	1	30	Full duplex	Asynchronous	ANSI	75 - 38.4K	Character	$575
	HP 700/41	WY-30; Televideo 905, 910, 925E; ADDS Viewpoint A2; Lear Siegler ADM3A/ ADM5; Qume QVT-101; Hazeltine 1500	1,920 char.	2	14	Monochrome	2	58	Full and half duplex	Asynchronous	ASCII	300 - 38.4K	Character, block, protect, copy print, transparent print	$375
	HP 700/71	IBM 3191 Models A and B	1,920 char.	1	14	Monochrome	1	24	Proprietary to IBM	Asynchronous	EBCDIC	2.3 MHz	IBM	$695
	HP 700/92	HP 2392A; DEC VT220, VT100, VT52	1,920 or 3,168 char.	6	14	Monochrome	1	16	Full duplex	Asynchronous	ASCII	75 - 38.4K	Block, character	$895
	HP 700/94	HP 2394A; DEC VT220, VT100, VT52	1,920 or 3,168 char.	16	14	Monochrome	1	16	Full duplex	Asynchronous	ASCII	75 - 38.4K	Block, character	$1,095
Honeywell Bull, Inc. (617) 671-6000	HDS-1	ADDS Viewpoint; Hazeltine 1500; Televideo 910, 925; Lear Siegler ADM 3A/5; WY-50	2,000 char.	2	14	Monochrome	3	14	Full duplex	Asynchronous	ASCII	38.4K	Character, block	$535
	HDS-3	DEC VT100, VT220, VT52; WY-50+	2,000 - 3,360 char.	1	14	Monochrome	1	16	Full duplex	Asynchronous	ASCII, ANSI	38.4K	Character, block	$750
	HDS-6	VIP7200, VIP7205, 2.04	2,000 - 3,360 char.	2	14	Monochrome	6	12	Full duplex	Asynchronous	ASCII, ANSI	9.6K	Character, block	$950
	HDS-7	VIP7300, VIP7105, 2.04	2,000 - 3,360 char.	2	14	Monochrome	6	12	Full duplex	Asynchronous, synchronous	ASCII, ANSI	9.6K	Character, block	$1,200
Houston Computer Services, Inc. (713) 568-9900	Plus 10 Model 5	TI 924, 931 plug-compatible	1,920 char.	4	14	Monochrome	1	32	Full and half duplex	Asynchronous	ASCII	50 - 19.2K	Character	$679
	Plus 10 Model 6	TI 924, 931 plug-compatible	1,920 char.	1	14	Monochrome	1	32	Full and half duplex	Asynchronous	ASCII	To 19.2K	Character	$629
	P100 Plus 10 Model 100	TI 924, 931 plug-compatible	1,280 char.	32K bytes	6	Monochrome	1	None	Full and half duplex	Asynchronous	ASCII	300 or 1,200	Character	$995
Human Designed Systems, Inc. (800) casual	HDS 2000	DEC VT200, VT100, VT52; Tektronix 4014, 4105	1,920 - 3,168 char.	4	15	Monochrome	6	128	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Character	From $995
IBM Contact local IBM sales office	370 Display Model 3193	IBM 3270	1,920 - 3,840 char.	2	15	Monochrome	2	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$2,495
	370 Display Models 3191A, 3191B	IBM 3270	1,920 char.	1	12	Monochrome	—	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$1,235
	3192D	IBM 370	1,920 - 3,564 char.	3	15	Monochrome	1	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$1,795
	370 Models 3191D, 3161E	IBM 3270	1,920 - 2,560 char.	3	14	Monochrome	1	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$1,423
	370 Display Model 3179	IBM 3270	1,920 - 2,560 char.	1	14	Color	—	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$2,095
	3192G	IBM 370	1,920 - 2,560 char.	1	14	Color	1	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$2,795
	3192C	IBM 370	1,960 - 2,560 char.	3	14	Color	1	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$1,895
	3192L	IBM 370	1,960 - 2,560 char.	3	14	Color	1	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$2,295
	3192F	IBM 370	1,920 - 3,564 char.	3	14	Color	1	24	Half duplex	Synchronous	EBCDIC	56K - 1.25M	—	$2,095
Information, Inc. (617) 668-6970	Mini 107 series	IBM 3197, 3101, 3151, 3101-21, 3301	2,000 or 3,000 char.	NA	14	Monochrome	1 or 2	25	Full duplex	Asynchronous	EBCDIC	19K	To model	$1,195 - $1,495
IS, Inc. (201) 343-8353	IS 391D	IBM 3191D, 3270	1,920 - 2,560 char.	1	14	Monochrome	NA	24	Half duplex	Synchronous	EBCDIC	2.5M	Menu, block, character	Not provided
	IS 392 D	IBM 3192D, 3270	1,920 - 3,564 char.	4	14	Monochrome	NA	24	Half duplex	Synchronous	EBCDIC	2.5M	Menu, block, character	Not provided

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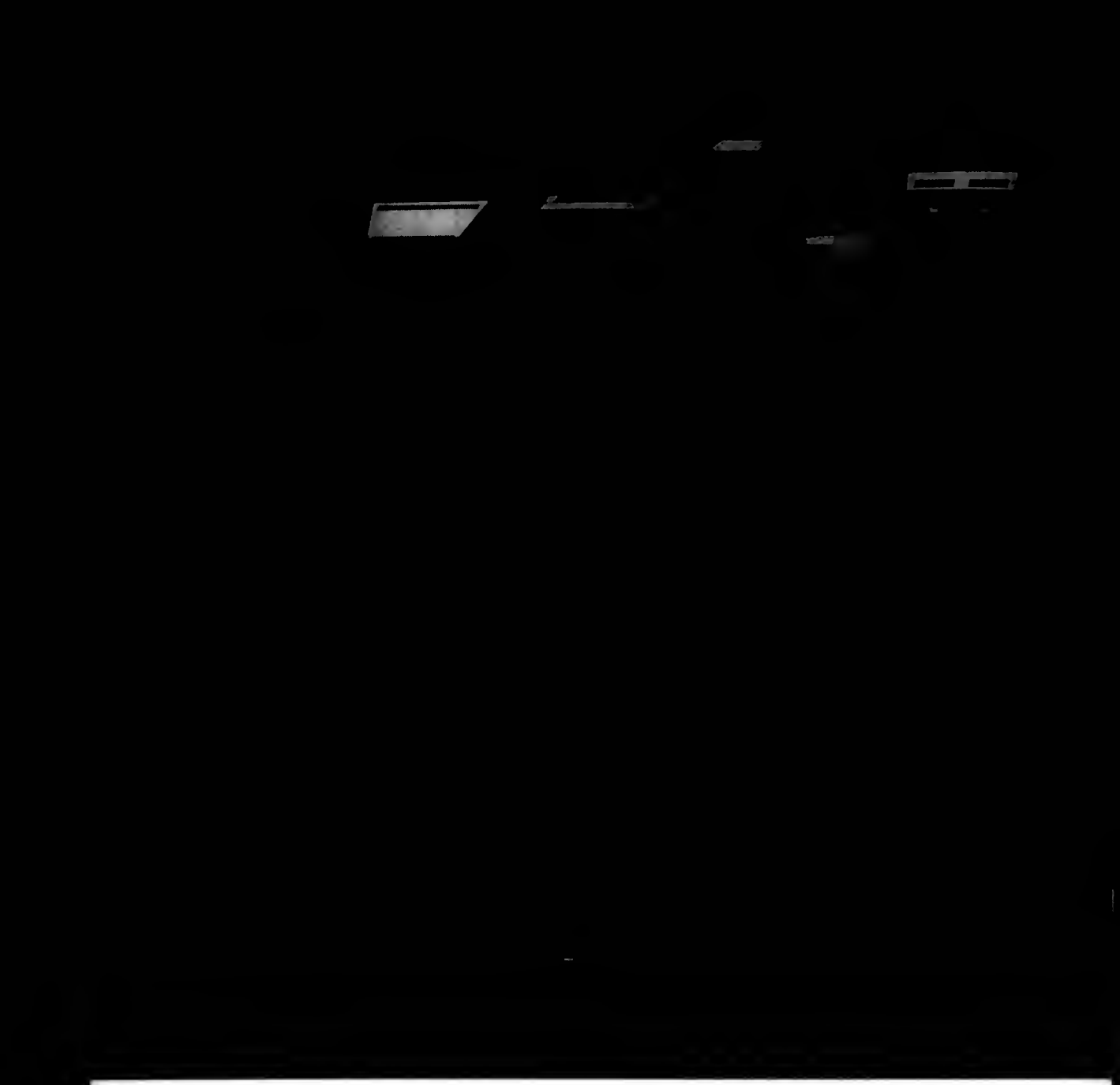
IBS, Inc. (301) 348-6863	IS 391A	IBM 3191, 3270	1,980 char.	2	14	Monochrome	NA	24	Half duplex	Synchronous	EBCDIC	2.5M	Mass, block, character	Not provided
	IS 368C	IBM 3198, 3270	1,980 - 3,564 char.	1	14	Color	NA	24	Half duplex	Synchronous	EBCDIC	2.5M	Mass, block, character	Not provided
	IS 368F	IBM 3198F, 3270	1,980 - 3,564 char.	4	14	Color	NA	24	Half duplex	Synchronous	EBCDIC	2.5M	Mass, block, character	Not provided
	IS 306	IBM 3196, 3180-2, System/34, 36, 38	1,980 - 3,564 char.	1	14	Monochrome	1	24	Half duplex	Synchronous	EBCDIC	1M	Mass, block, character	Not provided
	IS 307-1	IBM 3180-2, 3197-1, System/34, 36, 38	1,980 - 3,564 char.	1	—	—	—	—	Half duplex	Synchronous	EBCDIC	1M	Mass, block, character	Not provided
	IS 307-1C	IBM 2179-2, System/34, 36, 38	1,980 char.	1	14	Color	1	24	Half duplex	Synchronous	EBCDIC	1M	Mass, block, character	Not provided
	IS 220	DEC VT220	From 1,980 char.	1	14	Monochrome	1	30	Half duplex	Synchronous	ASCII	9.6K	Character, line	Not provided
Informer Computer Terminals, Inc. (714) 891-1112	Model 207 Portable	IBM 3270, DEC VAX	1,920 or 3,168 char.	16K (DEC), 32K (IBM)	9	Monochrome, color	4	24 (IBM)	Full and half duplex	Asynchronous, synchronous	ASCII, SNA/SDLC[2] bi-synchronous	To 9.6K	Character	$1,690-$3,400
	Model 204	IBM 3270, DEC VAX	1,920 or 3,168 char.	16K (DEC), 32K (IBM)	9	Monochrome, color	4	24 (IBM)	Full and half duplex	Asynchronous, synchronous	ASCII, SNA/SDLC bi-synchronous	To 9.6K	Character	$1,690-$3,400
	Model 205	IBM 3270, DEC VAX	1,920 or 3,168 char.	16K (DEC), 32K (IBM)	12	Monochrome, color	4	24 (IBM)	Full and half duplex	Asynchronous, synchronous	ASCII, SNA/SDLC bi-synchronous	To 9.6K	Character	$1,690-$3,400
Intecolor Corp. (404) 449-5961	AG1024-30E	Tektronix 4105A; DEC VT100	2,400 char.	2 - 8	20	Color	8	8	Full and half duplex	Asynchronous	ANSI, ASCII	38.4K	Character	$4,195
	Colortrend 210	DEC VT52, VT100	1,980 char.	2	14	Color	None	24	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	Character	$1,395
	Colortrend 220	DEC VT52, VT100, VT220	2,400 char.	1	14	Color	None	15	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	Character	$1,695
	AG 640-20E	DEC VT100; Tektronix 4105A	2,400 char.	2 - 8	20	Color	8	8	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Character	$3,295
Kimtron Corp. (408) 436-6550	KT-22	DEC VT220, VT100, VT52	3,168 char.	2 or 2	14	Monochrome	1	50	Full and half duplex	Asynchronous	ANSI, ASCII	50 - 38.4K	Character	$599
	KT-22/PC	DEC VT220, VT100, VT52; Kimtron KT-22PC, KT-221X	3,300 char.	3	14	Monochrome	2 - 4	80	Full and half duplex	Asynchronous	ANSI, ASCII, EBCDIC	50 - 38.4K	Character	$749
	KT-22/Advanced	DEC VT220, VT100, VT52	3,168 char.	3	14	Monochrome	4	30	Full and half duplex	Asynchronous	ANSI, ASCII	50 - 38.4K	Character	$749
	KT-5	Lear Siegler ADM 3A/5; DEC VT52, Televideo 920/925; Hazeltine 1500; ADDS Regent 25	3,168 char.	2	14	Monochrome	1	44	Full and half duplex	Asynchronous	ASCII	19.2K	Block, character	$399
	KT-50	Lear Siegler ADM 3A/5; DEC VT52; Televideo 920/925; Hazeltine 1500; ADDS Regent 25	3,168 char.	2	14	Monochrome	1	44	Full and half duplex	Asynchronous	ASCII	19.2K	Block, character	$499
	KT-70PC	Kimtron KT-7, C, KT7IX, KT-7, optional KT-7QNX	2,000 char.	1	14	Monochrome	1	80	Full and half duplex	Asynchronous	ASCII, EBCDIC	19.2K	Block, character	$599
	KT-70	Kimtron KT-7; Televideo 920/925; DEC VT100; DG D100/200	1,920 char.	1	14	Monochrome	1	44	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	Block, character	$599
Lemper Technologies, Inc. (416) 475-0128	Vision II 4200	DEC VT220	From 1,980 char.	255 lines	14	Monochrome	NA	96	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$985
	Vision II 4214 Tektronix Graphic Display Terminal	DEC VT200	From 1,980 char.	255 lines	14	Monochrome	NA	96	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$1,395
	Vision II 4200 Tektronix and Regis Graphic Display Terminal	DEC VT220	From 1,980 char.	255 lines	14	Monochrome	NA	96	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$1,495
	Vision II 8820-I Intelligent Unit	DEC VT220	From 1,980 char.	255 lines	14	Monochrome	NA	96	Full duplex	Asynchronous	ASCII	50 - 19.2K	Character	$2,995
Lee Data Corp (800) LEE-DATA	Models 1222, 2131, 1191, 1192, Series 80	IBM 3270	—	Varies	14	Both	4	24	Full and half duplex	Asynchronous, synchronous	ASCII, EBCDIC	1.2M	Varies	$1,100-$4,000
Liberty Electronics USA, Inc. (415) 743-7000	Freedom 1	Freedom 200; WY-60; Televideo 950; ADDS Viewpoint; Lear Seigler ADM 31	3,168 char.	2 - 4	14	Monochrome	—	44	Full and half duplex	—	ASCII	50 - 38.4K	Character, line	$449
	Freedom 1 ANSI	DEC VT200, VT100, VT52; DG Dasher 210, 211	3,168 char.	1	14	Monochrome	NA	44	Full and half duplex	Asynchronous	ANSI	50 - 38.4K	Character	$449
	Freedom 1 Plus	IBM PC; Freedom 200; WY-60; Televideo 950, 925; ADDS Viewpoint; Lear Siegler ADM 31	3,168 char.	1 - 4	14	Monochrome	NA	44	Full and half duplex	Asynchronous	ASCII	50 - 38.4K	Character	$549
	Freedom 1 Turbo	IBM PC; Freedom 200; WY-60; Televideo 950, 925; ADDS Viewpoint; Lear Siegler ADM 31; DEC VT100, VT200, VT300; DG Dasher 210, 211	3,168 char.	1 - 4	14	Monochrome	NA	44	Full and half duplex	Asynchronous	ASCII, ANSI	50 - 38.4K	Character	$985



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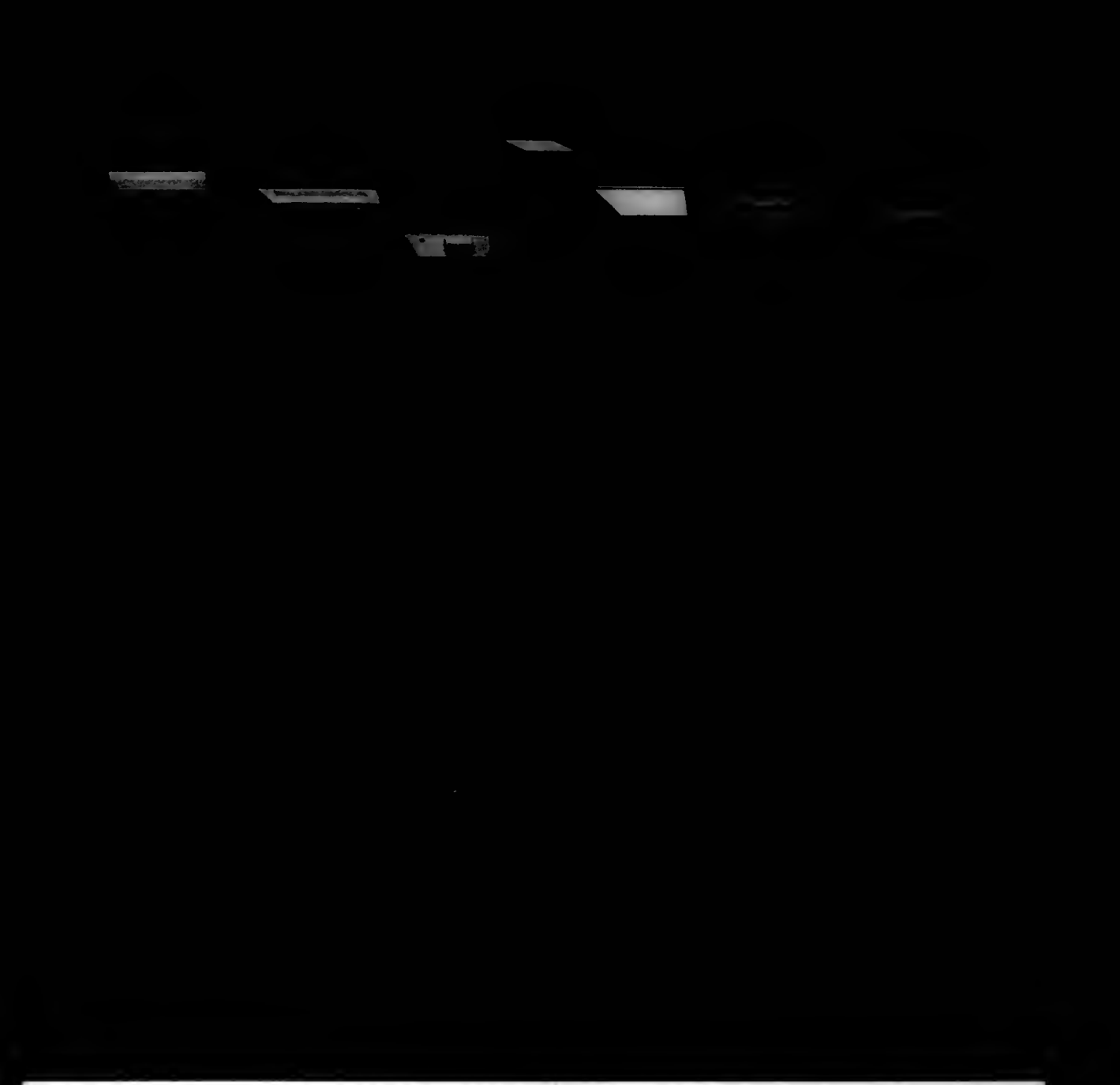

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COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Link Technologies, Inc. (415) 681-8000	Link 125	WY-50; Televideo 925,910; Lear Siegler ADM 3A/5; ADDS A1, A2; VP60	1,920 char.	2	14	Monochrome	1	40	Full and half duplex	Asynchronous	ASCII	38.4K	Character, block, line	$535
	MC3	Link 125, PC Term; WY-50; Televideo 925, 910; Lear Siegler ADM 3A/5; ADDS A1, A2; VP60; DEC VT100; ANSI X.3.64	1,920 char.	6	14	Monochrome	2	40	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Character, block, line	$585
	MC10	DEC VT220, VT100, VT52; ANSI X.3.64; WY-50, WY-60; Televideo 955, 950, 925, 910; Lear Siegler ADM 3A, 5, 21; ADDS A1, A2, VP60	1,920 char.	7	14	Monochrome	4	40	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Character, block, line	$565
	PC Term	PC Term; Televideo 925, 910; Kimtron KT7 PC	1,920 char.	2	14	Monochrome	1	28	Full and half duplex	Asynchronous	ASCII, PC scan code	38.4K	Character, block, line	$695
	MC1	PC Term; Televideo 925, 910; Kimtron KT7 PC	1,920 char.	2	14	Monochrome	1	28	Full and half duplex	Asynchronous	ASCII, PC scan code	38.4K	Character, block, line	$495
	Link 220	DEC VT220, VT100, VT52, VT132; ANSI X.3.64	1,920 char.	2	19	Monochrome	1	36	Full and half duplex	Asynchronous	ANSI	38.4K	Character, block	$695
The Lynk Corp. (215) 265-3550	Lynkstation/ 196, 196E	IBM 2196, 5291 Model 2	1,920 char.	NA	15	Monochrome	1 (196), 2 (196E)	24	NA	Asynchronous	EBCDIC	NA	—	$1,250-$1,550
	Lynkstation/ 912	IBM 2196, 5291 Model 2	1,920 char.	NA	15	Monochrome	2	24	NA	Synchronous	EBCDIC	NA	—	$1,395
	Lynkstation/ 802	IBM 2180	3,564 char.	NA	15	Monochrome	2	24	NA	Synchronous	EBCDIC	NA	—	$1,625
	Lynkstation/ 197C	IBM 2197C, 2197D	3,564 char.	NA	14	Color	2	24	NA	Synchronous	EBCDIC	NA	—	$1,725
	Computinglynk	IBM 3180, IBM PC	3,564 char.	512K bytes	15	Monochrome	2	24	NA	Synchronous	EBCDIC	NA	—	$2,195
Magnavox Corp. (800) 235-8670	2190-C	IBM 3192C	1,920 - 3,440 char.	1	14	Color	1	24	Full and half duplex	Synchronous	EBCDIC	56K	Block	$1,845-$1,995
	2190-DS	IBM 3192D	1,920 - 3,564 char.	1	15	Monochrome	2	24	Full and half duplex	Synchronous	EBCDIC	56K	Block	$1,595-$1,695
	2191	IBM 3191D, 3191E	1,920 char.	1	19	Monochrome	1	24	Full and half duplex	Synchronous	EBCDIC	56K	Block	$1,395-$1,495
	2191	IBM 3191A, 3191B	1,920 char.	1	12	Monochrome	1	24	Full and half duplex	Synchronous	EBCDIC	56K	Block	$1,195
	2190-D	IBM 3192D	1,920 - 3,564 char.	1	15	Monochrome	1	24	Full and half duplex	Synchronous	EBCDIC	56K	Block	$1,745-$1,845
NCR Corp. (513) 445-5000	NCR 4970	ADDS Viewpoint/122; DEC VT220, VT100, VT52; ANSI X.3.64	1,920 - 3,168 char.	2	14	Monochrome	2	22	Full and half duplex	Asynchronous	ASCII	19.2K	Menu, block, line, character	$745
	NCR 4940	ADDS Viewpoint A1/A2; Regent 40; Hazeltine 1500; Televideo 925, 920, 910; WY-50; ANSI X.3.64	1,920 - 3,168 char.	2	14	Monochrome	NA	68	Full and half duplex	Asynchronous	ASCII	50 - 38.4K	Menu, block, line, character	$595
	NCR 4920	NCR 7930, 7900-M1, 7900-M1+, 7901	1,920 - 3,168 char.	2	14	Monochrome	NA	12 - 24	Full and half duplex	Asynchronous	ASCII	50 - 38.4K	Menu, block, line, character	$995
	ADDS 1010	ADDS Viewpoint A1/A2, 3A+; Viewpoint/+; Lear Siegler ADM 3A	1,920 char.	1	14	Monochrome	NA	12	Full and half duplex	Asynchronous	ASCII	110 - 19.2K	Menu, block, line, character	$395
	ADDS 2020	ADDS Viewpoint A1, A2; Regent 40; Hazeltine 1500; Televideo 925, 920, 910; WY-50	1,920 - 3,168 char.	1	14	Monochrome	NA	16 - 32	Full and half duplex	Asynchronous	ASCII	50 - 38.4K	Menu, block, line, character	$695
	ADDS 3220	ADDS Viewpoint/122; DEC VT220, VT100, VT52; ANSI X.3.64	1,920 - 3,168 char.	1	14	Monochrome	NA	22	Full and half duplex	Asynchronous	ANSI	50 - 19.2K	Menu, block, line, character	$695
	ADDS Viewpoint/Color	ADDS Viewpoint/60; Regent 40/60	2,000 char.	2	13	Color	NA	19	Full and half duplex	Asynchronous	ANSI	110 - 19.2K	Menu, block, line, character	$1,295
	ADDS Viewpoint/78	IBM 3278 Model 2 terminal with 3271 controller	1,920 char.	1	12	Monochrome	NA	24	Full and half duplex	Asynchronous	ASCII	110 - 19.2K	Menu, block, line, character	$1,095
	ADDS Viewpoint/78 Color	IBM 3278 Model 2 terminal with 3271 Model 2 controller	1,920 char.	1	13	Color	NA	24	Full and half duplex	Asynchronous	ASCII	110 - 19.2K	Menu, block, line, character	$1,595
Memorex Corp. (313) 994-6661	MPS 2513	DEC VT52, VT100; ANSI	—	—	12	Both	255	15	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	Menu	Not provided
	Series 4000	IBM PC AT	—	Software-dependent	14	Color	Software-dependent	30	Full and half duplex	Asynchronous	ASCII	38.4K	Character	$6,000
	Series 2000	ANSI X.3.64	2,000 char.	—	12	Both	2	15	Full and half duplex	Asynchronous	ASCII	38.4K	Character	$8,160
Northern Telecom, Inc. (800) 558-9936	Displayphone 220	DEC VT220, VT190, VT52	1,920 char.	2	9	Monochrome	1	32	Full and half duplex	Asynchronous	ANSI, ASCII	19.2K	Character	$895 or $1,095
Oyster Terminals Ltd. (913) 888-4774	The Oyster Terminal Family	DEC VT100	1,920 char.	1	9.5	Monochrome	—	40	Full and half duplex	—	ASCII	75 - 19.2K	Character	$995

COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Prime Computer, Inc. (617) 655-8000	PT1250	NA	3,864 char.	2	14	Monochrome	1	30	Full and half duplex	Asynchronous	ANSI	50 - 19.2K	Block, character	$595
Qume Corp. (800) 223-3479	QVT 203 Plus	DEC VT220	80 or 132 col. x 25 lines	2 or 4	14	Monochrome	—	15	Full and half duplex	—	ANSI, ASCII	To 38.4K	Block, line	$575
	QVT 212 GX	DEC VT100	1,920 char.	1	14	Monochrome	—	4	Full and half duplex	—	ANSI, ASCII	To 19.2K	Line	$995
Ramtek Corp. (408) 988-2211	4000	DEC VT220, VT100	80 col.	NA	19	Color	—	10	Serial or parallel	—	ASCII	To 38.4K	NA	From $30,000
	4322	DEC VT220, VT100	80 col.	4M bytes	16 - 19	Color	—	10	Serial or parallel	—	ASCII	To 38.4K	NA	From $8,395
	4327	DEC VT220, VT100	80 col.	4M bytes	16 - 19	Color	—	10	Serial or parallel	—	ASCII	To 38.4K	NA	From $15,995
Random Corp. (513) 835-0880	Colleague Laptop	DEC VT220	2,000 char.	6	10	Monochrome	1	20	Full and half duplex	Asynchronous	ANSI X.3.64	19.2K	Character	$995
	Colleague Plus Laptop Terminal	DEC VT220	2,000 char.	30	10	Monochrome	1	20	Full and half duplex	Asynchronous	ANSI X.3.64	19.2K	Character	$1,295
Relisys (408) 946-8887	RA2368	DEC VT200, VT100, VT52	1,920 - 3,186 char.	1	14	Monochrome	—	15	Full duplex	Asynchronous	ANSI	9.6K	Block	$995
	RA350	DEC VT52; Televideo 910, 925; Hazeltine 1500; Lear Siegler ADM 3A; ADDS Viewpoint	1,920 char.	1	14	Monochrome	None	16	Full and half duplex	Asynchronous	ASCII	19.2K	Block	$395
Systems, Inc. (519) 884-3440	KD 600TC	Kimtron PC7; DEC VT52; Televideo 925, 950	2,000 char.	8	User-selectable	Color or monochrome	1	30	Full and half duplex	Asynchronous	ASCII	19.2K	Character	Not provided
	KD 6220	DEC VT220	3,168 char.	1	14	Monochrome	1	14	Full and half duplex	Asynchronous	ANSI	19.2K	Character, block, line	$595
Tandem Computers, Inc. (408) 725-6000	6530 Model Page Display	Tandem 6530; IBM 3270	1,980 char.	18	14	Monochrome	1	18	Full and half duplex	Asynchronous	ASCII, ANSI, EBCDIC	19.2K	Block, character	$1,495
	6530 High Value Display	Tandem 6530; IBM 3270 (via IRMA3270 host software)	1,980 char.	6	12	Monochrome	1	10	Full and half duplex	Synchronous, asynchronous	ASCII, ANSI, EBCDIC	19.2K	Block, character	$1,895
	6530 High Value Display	Tandem 6530; IBM 3270 (via IRMA3270 host software)	1,980 char.	6	15	Monochrome	1	10	Full and half duplex	Asynchronous, synchronous	ASCII, ANSI, EBCDIC	19.2K	Block, character	$1,895
Tatung Co. of America, Inc. (213) 637-2105	TVT 7261	DEC VT100, VT52	2,000 char.	2 or 4	14	Monochrome	—	12	Full and half duplex	—	ASCII	75 - 19.2K	—	$650
Telex Computer Products, Inc. (813) 884-0857	170	IBM 3179	1,920 - 3,440 char.	1	14	Color	4	24	Half duplex	Synchronous	EBCDIC	19.2K	Block	$1,845 - $2,145
	886X	IBM 3191 Models D and E	1,920 - 3,564 char.	1	12	Monochrome	4	24	Half duplex	Synchronous	EBCDIC	19.2K	Block	$1,795
	979	IBM 3179	1,920 char.	1	12	Color	4	24	Half duplex	Synchronous	EBCDIC	19.2K	Block	$1,795
	191-A/B	IBM 3191 Models A and B	1,920 char.	1	12	Monochrome	6	24	Half duplex	Synchronous	EBCDIC	19.2K	Block	$1,695
	978	IBM 3178	1,920 char.	1	12	Monochrome	4	24	Half duplex	Synchronous	EBCDIC	19.2K	Block	$1,695
	8179	IBM 3270	1,920 char.	7	14	Color	10	24	Full and half duplex	Asynchronous, synchronous	ASCII, EBCDIC	19.2K	Block, character	$2,595
	C978	IBM 3270	1,920 char.	2	12	Monochrome	10	24	Full and half duplex	Asynchronous, synchronous	ASCII, EBCDIC	19.2K	Block, character	$2,695
Teleray Division of Research, Inc. (612) 941-3300	Teleray Model 20-DDG	DEC VT220; DG D211	3,168 char.	2	14	Monochrome	4	32	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	Block, character, line, window, selected area, page, memory	$895
	Teleray Model 20-DHP	DEC VT220; HP 700/92	3,168 char.	9	14	Monochrome	6	32 (each mode)	Full and half duplex	Asynchronous	ANSI, ASCII	19.2K	See entry for 20-DDG	$895
	Tel 2	DEC VT100; Honeywell HDS-2	3,168 char.	5,760 char.	14	Monochrome	6	32	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	See entry for 20-DDG	$800
	Tel 5	DEC VT100; Honeywell HDS-5	3,168 char.	5,760 char.	14	Monochrome	6	32	Full and half duplex	Asynchronous	ASCII, ANSI	19.2K	See entry for 20-DDG	$900
	Tel 7	DEV VT100; Honeywell HDS-7	3,168 char.	5,760 char.	14	Monochrome	6	32	Full and half duplex	Asynchronous, synchronous	ASCII, ANSI	19.2K	See entry for 20-DDG	$1,160
Televideo Systems, Inc. (408) 745-7760	945	Televideo 910, 910+, 920, 920+, 925; ADDS Viewpoint A3; Hazeltine 1420, 1500; Lear Siegler ADM3A, A+ (does not emulate 52)	1,920 char.	1	14	Monochrome	1	16	Full and half duplex	Asynchronous	ASCII	19.2K	Block, character, line	$689
	955	Televideo 955, 950	3,160 char.	2	14	Monochrome	1	64	Full and half duplex	Asynchronous	ASCII	38.4K	Block, character, line	$949
	965	Televideo 950, 955+, 970, 970+, 975, 975+, 980, 980+, 985, 990, 990+, 995, 995+, 997, 997+, 998; ADDS Viewpoint A3; Hazeltine 1420, 1500; Lear Siegler ADM3A, A+ (does not emulate 52); DG D200	6,480 char.	7	14	Monochrome	2	120	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Block, character, line	$949
Televideo Systems, Inc. (408) 745-7760	9220	DEC VT220, VT100, VT52	3,168 char.	1	14	Monochrome	1	30	Full and half duplex	Asynchronous	ANSI	19.2K	Character	$619

COMPANY	PRODUCT	EMULATION MODE	DISPLAY CAPACITY (PER PAGE)	MEMORY CAPACITY (IN PAGES)	SCREEN AREA (IN DIAGONAL INCHES)	COLOR OR MONOCHROME	NUMBER OF SIMULTANEOUS SPLIT SCREEN/WINDOWS	NUMBER OF PROGRAM FUNCTION KEYS	TRANSMISSION MODE	ASYNCHRONOUS OR SYNCHRONOUS	TRANSMISSION CODE	RATE OF TRANSMISSION (BIT/SEC.)	FORMAT MODE	PRICE
Tava-Tandon, Inc. (800) 821-8270 (510) 895-8330 (Calif.)	Miracle-101	IBM 3191	1,920 char.	1	12	Monochrome	1	24	Half duplex	Synchronous	IBCDIC	2.3M	Block	$1,295
	M-191B	IBM 3191	1,920 char.	1	12	Monochrome	1	24	Half duplex	Synchronous	IBCDIC	2.3M	Block	$1,695
	M-191P	IBM 3191	1,920 char.	1	12	Monochrome	1	24	Half duplex	Synchronous	IBCDIC	2.3M	Block	$1,695
	M-191L	IBM 3191	1,920 char.	1	12	Monochrome	1	24	Half duplex	Synchronous	IBCDIC	2.3M	Block	$1,645
	M-191M	IBM 3191	1,920 char.	1	12	Monochrome	1	24	Half duplex	Synchronous	IBCDIC	2.3M	Block	$1,645
Texas Instruments, Inc. (800) 527-3500	Travelmate 1200 Portable	DEC VT100, VT52	80 col. x 16 lines	44K bytes	11.7	Monochrome	—	—	Full and half duplex	—	ASCII	300 - 1,200	Character	$1,295
Unisys Corp. (215) 542-8360	SVT1139	Unisys UT200	1,920 - 3,168 char.	1	14	Monochrome	2	32	Full duplex	Synchronous	ASCII	19.2K	Block	$795
	SVT1131	Unisys UT300L	1,920 - 3,168 char.	1	14	Monochrome	2	32	Half duplex	Synchronous	ASCII	38K	Block	$795
	SVT1131 Airline Terminal	Programmable Airline Reservation System	2,000 char.	8	14	Monochrome	—	32	Half duplex	Synchronous	ASCII	38K	Block	$695
	SVT1138	Unisys UT300D local workstation	1,920 - 3,168 char.	1	14	Monochrome	Mem	32	Full duplex	Asynchronous	ASCII	9.6K	—	$795
	SVT1139	Unisys UT320 remote workstation	1,920 - 3,168 char.	1	14	Monochrome	Mem	32	Full duplex	Synchronous	ASCII	19.2K	Block	$795
	SVT1136	Unisys VT300	1,920 - 3,168 char.	1	14	Monochrome	Mem	32	Full duplex	Synchronous	ASCII	19.2K	Block	$795
	SVT1138	Unisys UTS30T editing terminal	1,920 - 3,168 char.	1	14	Monochrome	2	32	Full duplex	Asynchronous	ASCII	64K	Block	$795
	UVT1234	DEC VT220, VT100; ANSI X.3.64	1,920 - 3,168 char.	1	14	Monochrome	Mem	20	Half duplex	Asynchronous	ASCII	38.4K	Block, character	$695-$795
Visual Technology, Inc. (617) 459-4903	Visual 601	WY-50; Tektronix 4010, 4014	3,168 char.	2	14	Monochrome	2	32	Full and half duplex	Asynchronous	ASCII	110 - 38.4K	Character, block	$695
	Visual 602	DEC VT100; WY-50; Tektronix 4010, 4014	3,168 char.	2	14	Monochrome	2	30	Full and half duplex	Asynchronous	ASCII, ANSI	110 - 38.4K	Character, block	$695
	Visual 603	DEC VT220; Tektronix 4010, 4014	3,300 char.	1	14	Monochrome	2	30	Full duplex	Asynchronous	ASCII, ANSI	110 - 38.4K	Character	$695
	Visual 630	DEC VT220; Tektronix 4010, 4014	6,600 char.	80	14	Monochrome	2	30	Full duplex	Asynchronous	ASCII, ANSI	110 - 38.4K	Character	$995
	Visual 241	DEC VT241; Regis Graphic	3,828 char.	1	13	Color	2	15	Full duplex	Asynchronous	ASCII, ANSI	110 - 19.2K	Character	$1,895
Wang Laboratories, Inc. (800) 835-9264	4238A-VS DP/PP Workstation with Keyboard	NA	2,000 char.	64K bytes	12	Monochrome	4	16	Proprietary	Synchronous	WBCII	4.2M	Mem	$2,300
	2110A Asynchronous Workstation	DEC VT102	2,000 - 3,300 char.	—	14	Monochrome	1	16	Full and half duplex	Asynchronous	ASCII, WBCII, ANSI X.3.64	19.2K	Mem	$995
Wyse Technology (408) 433-1000	WY-60	WY-50, WY-50+, WY-75; ANSI X.3.64; DEC VT100, VT52; DG D200, D210; Lear Siegler ADM 3A/5, 31; Televideo 918, 920, 925, 950, 955; ADDS Viewpoint A2, 60; Hazeltine 1500; IBM 3101, 3181, PC AT	5,808 char.	7	14	Monochrome	2	20	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Block, character	$599
	WY-99GT	Tektronix 4010, 4014; Hercules; IBM CGA; WY-50, WY-50+; ANSI X.3.64; DEC VT220, VT100, VT52; Televideo 950, 925, 920, 912, 910; ADDS Viewpoint A2; Hazeltine 1500; Lear Siegler ADM 3A/5, 31	3,432 char.	2	14	Monochrome	2	20	Full and half duplex	Asynchronous	ASCII, ANSI	38.4K	Block, character	$849
	WY-350	WY-50	3,432 char.	1	14	Color	2	32	Full and half duplex	Asynchronous	ASCII	38.4K	Block, character	$999
	WY-85	DEC VT220, VT100, VT52	3,432 char.	1	14	Monochrome	1	30	Full and half duplex	Asynchronous	ANSI	38.4K	Block, character	$599
Xyplex, Inc. (978) 692-6971	Industrial Terminals	DEC VT200, VT220	800 char.	16K - 64K bytes	—	Color or monochrome	10	97 - 31	Full and half duplex	Asynchronous	ANSI, Hazeltine	19.2K	Block	$1,595-$2,695
Zentec Corp. (408) 727-7662	ADM 12 Plus	Tandem 6510; Lear Siegler ADM 2, 12, 31; Televideo 912, 920, 925, 950; Esprit 6318	1,920 - 3,168 char.	2	14	Monochrome	NA	32	Full and half duplex	Asynchronous	ASCII	19.2K	Character	$584
	ADM 1178	IBM 3278	1,920 char.	1	14	Monochrome	NA	24	Full and half duplex	Asynchronous	ASCII	18.2K	Character	$695
	ADM 220	DEC VT220	1,920 - 3,168 char.	1	14	Monochrome	NA	30	Full duplex	—	ASCII, ANSI	19.2K	Character	$666
	ADM 11	Lear Siegler ADM 3A/5; ADDS Viewpoint, Regent; Hazeltine 1400, 1420, 1500; DEC VT52	1,920 char.	1	14	Monochrome	NA	8	Full and half duplex	Asynchronous	ASCII	19.2K	Character	$566
	8302	HP 2302A, 700/92	3,564 char.	0	14	Monochrome	NA	10	Full and half duplex	Asynchronous	ANSI	19.2K	Block, character	$849

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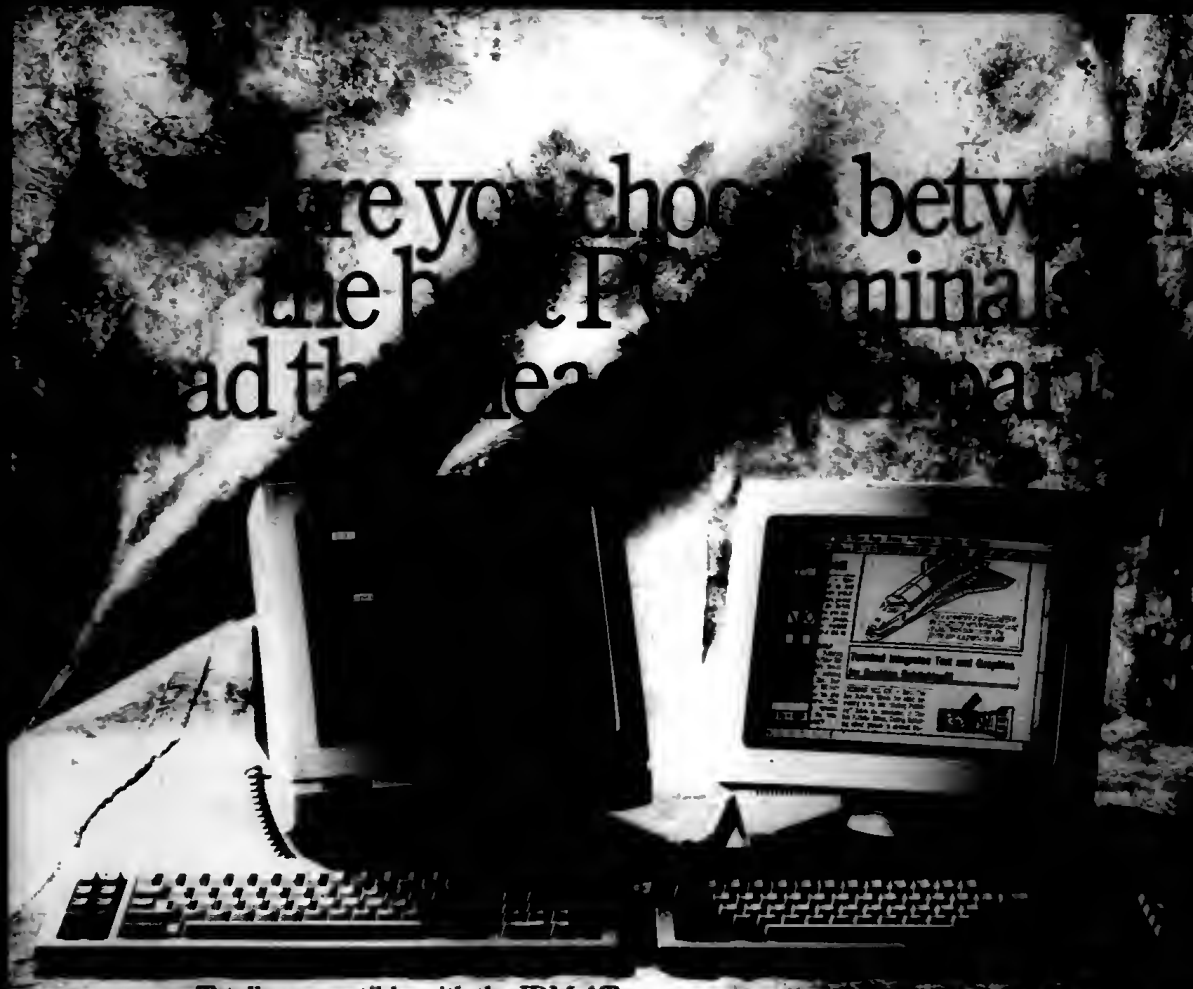

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Controlling by strolling

Management by walking. No, it's not the latest management theory from Stanford University or MIT. And I certainly can't claim to be the originator of the phrase. I hesitate to call it anything but a technique for managing — a control technique.

I do it a lot. To see me, you may think I like the exercise. It does beat sitting at a desk all day and could be useful in organizations in which you have to keep looking over your shoulder just to keep your job. I've worked in that environment, too. You know, a moving target is hard to hit. But that's another column.

As a manager, you set things in motion in order to accomplish something. But then you have to keep things, or activities, on target. Whether it's for your own department or activities that you perform for others, exercising control is probably the most important aspect of your job once a project is in progress.

So what do you get by walking around? One thing is visibility. People see you, and you see them. If you manage an MIS department, as I do, you quickly learn that many of the people you provide services for view you and your department as, at best, slightly different or a division that always brings the system down when they need it most. Being seen makes you familiar, and familiarity breeds acceptance.

Visibility also brings accessibility. People still like face-to-face contact, especially if you're new on the job or dealing with new users. By being there, you're more apt to hear a few words of praise. You also hear about the problems; and that's important. If things are going wrong, you can't do anything to fix them if you don't hear about them. Too often, a manager finds out too late.

No matter how much you plan and organize and exercise some form of direction and control, some problems are bound to arise. Walking around gives you the informal opportunity to smooth ruffled feathers. It's better to have someone complain face-to-face than to be mentioned on a "nasty-gram"

Continued on page 69

Hands-off managing

Globe-trotting exec practices laissez-faire

BY STEPHEN JONES
CW STAFF

Whether his staff is installing an information system for an airstrip in the steamy jungles of Brazil or trundling a mainframe down the hall from his San Francisco office, H. William Howard follows the same philosophy: Give workers the resources they need and turn them loose.

As vice-president and manager of information services for construction firm Bechtel Group, Inc., Howard uses his hands-off approach with the more than 800 MIS employees he oversees at Bechtel's home office and construction sites across the globe.

"Employees feel that, 'If you think you know so much about a job, why don't you do it yourself?' I learned a long time ago that I don't know enough to do everybody's job," Howard says. "I'm here to provide the tools and the support they need."

Howard, 52, honed his laissez-faire style while managing the installation of MIS shops at a variety of far-flung Bechtel job sites in the mid-1970s — from a power plant in Colstrip, Mont., to a refinery near a Saudi Arabian fishing village.

While working in locales that he says most people have never heard of, Howard learned the benefit of building a crack team of engineers and systems planners that could carry out a mission with little hand-holding. That allowed him to move on to the next project site and, eventually, up the corporate ladder.

"You should be able to tell a guy what needs to be done, not how to do it. If you have to tell him how to do the work, you probably don't need him," he says.

But giving employees too much room can backfire. A stern hand is needed, Howard says, to keep a distant MIS project on track and to provide regular rewards for accomplishments in the field and at home.

Today, Howard uses that philosophy to manage a $50 million DP/MIS budget and to oversee the worldwide administration of Bechtel's information services. Bechtel is reportedly the world's largest privately held company, with annual revenue of about $5 billion.

Despite his wide range of responsibilities, Howard is able to maintain a folksy personal touch that keeps him connected with

Continued on page 69

PROFILE

H. William Howard

Position: *Vice-president and manager of information services, Bechtel Group, Inc.*

Mission: *Planning and running a $50 million organization, supporting staff and end users, promoting a pleasant workplace.*

DUAL-CAREER TRACKS

But I don't *want* to be a manager

BY DANA DAVIS
SPECIAL TO CW

Not so long ago, few MIS workers believed there was more than one way to the top. Instead, they thought executive suites were reserved for — well, executives — guys who graduated from business school, wore suits and came up through the corporate ranks via the managerial ladder. Techies, as everyone knew, did not enjoy corner-office views. They worked in basements with big numbers on incomprehensible equipment.

And if a techie wanted to get ahead, it was in his best interest to find a tailor and merge with management. The transformation was sometimes disastrous; while the suit sometimes fit, the new job often didn't.

As a result, companies began to examine dual-career ladders — promotion systems that reward technical personnel with similar pay, perks and titles as those enjoyed by managers, without requiring them to leave their MIS posts.

Big returns

Arthur Andersen & Co., the largest of the Big Eight accounting firms, began employing the dual-track system almost two years ago, says Peter Fuchs, managing director of practice management and planning at the company's Chicago headquarters. "The system allows us to retain and promote excellent technical people," he says.

The company decided to go with the system after studying future technical needs within the financial service marketplace. "In the next three to five years, the

DAN SWEETMAN

technical jobs will require more in-depth and functional skills, higher academic degrees and more experience," Fuchs says.

Those who fulfill the requirements and stay with Arthur Andersen can expect big returns. A five-rung technical ladder consisting of programmer, analyst, senior technical analyst, technical manager and senior technical manager enable technical employees to attain the same promotion levels as their managerial counterparts. "An advanced technical analyst with 10

Continued on page 68

Computer crime foe nabs public service award

BY MITCH BETTS
CW STAFF

PARK RIDGE, Ill. — U.S. Rep. William J. Hughes (D-N.J.), whose persistent efforts led to the passage of federal computer crime laws in 1984 and 1986, was recently chosen as the first recipient of a public service award from the Data Processing Management Association (DPMA).

The DPMA's Information Processing Public Service Award recognizes public officials who have taken leadership roles on issues affecting the information management profession.

William J. Hughes

As chairman of the U.S. House Subcommittee on Crime, Hughes played a major role in writing and enacting the Computer Fraud and Abuse Act of 1984, which mostly covered U.S. government computers, and a more comprehensive version of the law in 1986. The 1986 version outlawed interstate computer crimes involving private-sector computer systems.

Hughes, in a statement accepting the award, criticized common perceptions of computer criminals. "All too often, computer hackers are glamorized by the media as intellectual thrill seekers," he said.

"The public really hasn't grasped . . . that computer hackers are often sophisticated criminals whose illegal conduct is capable of causing enormous damage to business and industry, personal privacy and even our national security."

Hughes, who was vacationing out of the country and could not be reached for comment, said he will work with the DPMA and others to ensure that criminal laws keep pace with technological advances.

"Government and industry must work together to prevent computer-related crimes. When such crimes do occur, we must have laws in place to punish those who are responsible for them," Hughes said.

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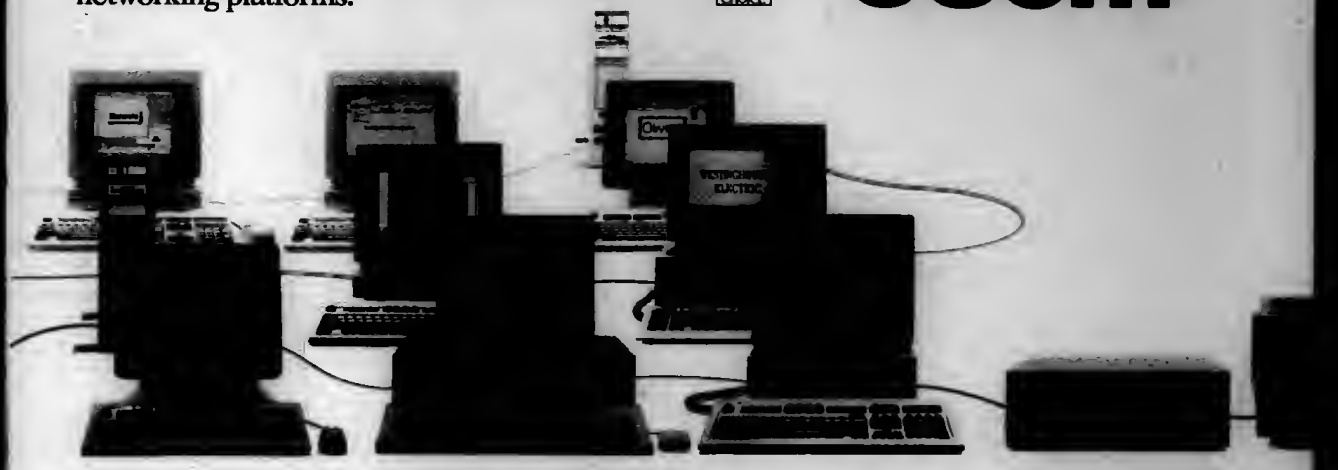

A manager

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years experience could earn the same amount as a mid-level marketing manager," Fuchs says. "In some exceptional situations," he adds, "a senior technical manager could earn more than some partner classifications."

Fewer than 50 of the 1,000 people Arthur Andersen employs in its domestic and international MIS operations will reach that top technical earning level, Fuchs notes (See chart right).

Dual-track perks

Money, however, isn't the only advantage associated with the dual track, says Loren Heun, information scientist with Upjohn Co. in Kalamazoo, Mich. "We have no set policy on free research time, but individual managers will allow you to spend up to 15% [of your work week] to research areas of particular interest to you and the company," he says.

According to David Miron, principal and organizational analyst with Temple Barker & Sloane, Inc. in Lexington, Mass., other dual-track perks include the following:

- Exposure to the latest technology.
- Opportunities to present papers at professional conferences.
- Chances to meet clients with a variety of complex needs.
- Utilization of technical problem-solving capabilities.
- Added professional recognition.

And the above advantages are in addition to preventing their technical skills from becoming obsolete, Miron says.

Obsolescence can also come about when technicians can't keep up with changes in their field. Consequently, education can become a big factor for technical promotions. "In order to reach that top level of what we call information scientist, that individual will probably need a Ph.D. in computer science along with three to five years of company-specific experience and an extensive knowledge of some specialized systems," Heun says.

"A master's degree with three to five years of company-specific experience can also help you get into positions that are equal to middle management." Such an employee could expect to earn a salary of around $60,000, Heun says.

Besides academic degrees, many companies encourage on-the-track techies to attend a variety of conferences. "We take that process one step further," says John Collins, vice-president of MIS for Hallmark Cards, Inc. in Kansas City, Mo. "We not only send them to the latest classes and seminars, but we'll also send their managers with them," Collins says. That way, managers can gain an added appreciation of the responsibilities of their technical colleagues.

The company itself also receives benefits by using the system. "I haven't seen much job turnover in MIS here," Upjohn's Heun says, "and we've had [the dual tracks] since 1970."

In addition to job longevity, the system may also inspire company loyalty. "We won't hire from outside to fill our top MIS jobs. These are positions we've reserved for our super-talented technical people," Hallmark's Collins says. "This gives young, highly skilled people the opportunity to work toward a high pay level and status without management responsibilities. They know they have to earn the right to be promoted."

The dual-career track works well for both the company and the individual "because the company doesn't have to contend with so many bad and unhappy managers while also maintaining an excellent group of technical personnel," Miron says.

But that's not to say the system doesn't have a few drawbacks, notes William Cash, vice-president at New York-based consulting firm Cresap.

Administrative hassles

"When setting up the track, there can be a few administrative burdens. For example, how do you pick and choose who occupies the high-level positions? You can define the criteria for a management job more easily than you can define the qualification for a senior technical position," Cash says. "Companies must also decide how many positions they will create. Just how many positions can they afford? What should companies pay for these positions, and what benefits should accompany them?"

In some instances, the dual-track system can foster professional jealousies, Cash warns. "Companies set up the dual track for the best of reasons. They want to motivate and retain employees. But ask yourself what happens when five people are selected from the lab to receive these newly created prestigious jobs — along with the high salary and perks like the corner office, car and big title — and other lab workers say, 'Hey, we do the exact same thing as they do, and we're just as good as they are, so how come we're not getting the promotion?' These same people can understand why they don't get a *management* job. But this situation is obviously different."

Cash says he believes the system has many merits, but he cautions that company management must pay strict adherence to job criteria in order for the system to operate correctly.

At Upjohn, "every job is evaluated on a set criteria," Heun says. "Each job has an extensive written description that accompanies it. That goes for management, secretarial and technical. Employees must fulfill the job criteria before they receive a promotion."

Upjohn's promotional track includes eight rungs. The more than 300 MIS employees can expect to begin as associate systems and programming analysts or systems programming analysts. These positions are similar in pay and perks to a project manager slot on the managerial side.

Similarly, the middle technical levels — systems programming specialist, information system specialist and senior information systems specialist — can be compared with middle managerial posts.

Finally, the top three jobs are reserved for information scientists, who are ranked at levels of 1, 2 or 3, with 3 being the highest. Heun, a Level 2, says only a half-dozen or so make it to Level 3. "It's a difficult position to attain and entails lots of responsibility," he says. Indeed, this individual reports directly to a vice-president or director of information systems, Heun says.

While dual-track career programs may not be for everyone, Collins says he believes the dual system is necessary at Hallmark. "Before, analysts and programmers would peak out salarywise at the uppermost analyst position. But now we've provided a salary ladder equal to management, so that these people can get paid for their specialty without the added responsibility of managing others," he says. "Analysts used to take the management jobs in order to get the salary increase, because it was the only route they had to get ahead."

Crossover programs

In the past, some companies have tried to bring the technical and managerial paths closer together by making it possible for individuals to cross over and back without being labeled as "techie" or "manager."

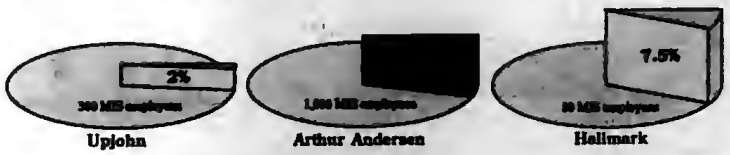
But that generally doesn't work, Miron says. "People who have too many activities accomplish fewer things. I think the majority of technical people want to grow in their technical skills and be measured on a technical basis."

Collins agrees that the successful cross-over-and-back process is the exception rather than the rule. Although he is has achieved the position of MIS vice-president at Hallmark, he readily admits it wasn't because he took advantage of any dual-career tracks. "I'm just not very technical. That's probably why they made me a manager," he says.

Davis is a research analyst with Information Data Search, Inc. in Cambridge, Mass.

How many will rise to the top?

Of the current MIS employees at three major companies, only a small percentage will achieve the top position on the technical career path ladder



CW CHART

> "I HAVEN'T seen much job turnover in MIS here, and we've had [the dual tracks] since 1970."
>
> LOREN HEUN
> UPJOHN CO.

LOCAL HAPPENINGS

NORTHEAST

Bangor, Maine, Jan. 20. Data Processing Management Association (DPMA). Maine Pine Tree Chapter. Leadership Qualities, with former Gov. Ken Curtis. The Bangor Hilton. 5 p.m. Contact: J. Fireweger, Delta Chemicals, Inc., Searsport, Maine 04974.

New York, Jan. 20. DPMA, New York Chapter. Reviewing Controls in Automated Security Systems. Beekman Restaurant, 15 Beekman St. 5 p.m. Contact: Mary Vogt, 455 E. 83 St., New York, N.Y. 10028.

Boston, Jan. 21. Society for Information Management, Boston Chapter. What Can We Learn from European MIS? with John Thompson of Index Group. Anthony's Pier 4. 11:40 a.m. Contact: SIM, P.O. Box 116, Newton Lower Falls, Mass. 02162.

SOUTHEAST

Charlotte, N.C., Jan. 21. ASM, Queen City Chapter. Managing for the Future, with Robert E. Roberson of the University of South Carolina. Cosmos Steak House, $100 E. Independence Blvd. 6 p.m. Contact: Robert Yearwood, Metro Information Services, Suite 140, 7 Parkway Plaza, Charlotte, N.C. 28217.

Lafayette, La., Jan. 21. DPMA, Acadiana Chapter. Monthly meeting. Evangeline Steak House. Highway 167 S. 6:30 p.m. Contact: Debra Billeaud, Guaranty Bank and Trust Co., 4th Floor, 200 W. Congress, Lafayette, La. 70502.

MIDWEST

Fort Wayne, Ind., Jan. 19. ASM, Fort Wayne Chapter. Critical Success Factors for I/S, with Alan Stanford of Ernst & Whinney. Holiday Inn-Downtown, 300 E. Washington Blvd. Contact: Beth Hahill, Suite 103, 10427 Leo Road, Fort Wayne, Ind. 46825.

Hinsdale, Ill., Jan. 19. ASM, Oakbrook, O'Hare and Chicago chapters. Computer Crime, with U.S. Attorney Anton Valukas. Cyprem Restaurant, 500 E. Ogden Ave. 6 p.m. Contact: David P. Miller, 500 W. Glencoe Road, Palatine, Ill. 60067.

Dayton, Ohio, Jan. 19. ASM, Megacity Chapter. Monthly meeting. Officers Club, Wright-Patterson Air Force Base. 5:30 p.m. Contact: S. Beebe-Owen, Western Ohio Pizza, Inc., 2324 Stanley Ave., Dayton, Ohio 45404.

Columbus, Ohio, Jan. 27. ASM, Central Ohio Chapter. Children's Hospital's Use of Computers, with Malcolm Murray of Children's Hospital; Systems Application Architecture, with Dick O'Connor of IBM. Fawcett Center for Tomorrow, 2400 Olentangy River Road. 5 p.m. Contact: Deborah Maccoux, Columbus Southern Power Co., 215 N. Front St., Columbus, Ohio 43230.

WEST

Walnut Creek, Calif., Jan. 20. ASM, East Bay Chapter. Monthly dinner meeting. Contact: ASM, 33 Robert Road, Orinda, Calif. 94563.

San Francisco, Jan. 21. Association for Computing Machinery, Golden Gate Chapter. The Changing Role of Supercomputers, with Bence Gerber. Seven Hills, 252 California. 5:30 p.m. Contact: James M. Spitze, The Systems Consulting Consortium, Inc., P.O. Box 2331, Stanford, Calif. 94305.

Santa Monica, Calif., Jan. 23. DPMA, Los Angeles Chapter. 1988 Installation Dinner Dance. The Chronicle Restaurant, 2640 Main St. 8 p.m. Contact: DPMA, P.O. Box 1047, Hollywood, Calif. 90078.

CANADA

Kitchener, Ont., Jan. 18. ASM, Conestoga Chapter. I.S. Productivity, with Bruce Burgess of Gollnow-Hayward & Partners. Conestoga Inn. 8 p.m. Contact: Rich Clemmer, 49 Industrial Drive, Elmira, Ontario, Canada. N3B 3B1.

Toronto, January 18. DPMA, Toronto Chapter. Evolution of Computer Architecture, with Ken Kroeker of Hewlett-Packard. Royal York Hotel. 5:30 p.m. Contact: DPMA, Box 1004, Postal Station F, Toronto, Ont. M4Y 2L4.

Hands-off

CONTINUED FROM PAGE 65

most of his staff, says Dennis Slavich, Bechtel's chief financial officer and Howard's superior. Last month, for instance, Howard rented a Santa Claus suit and cruised the floors of the San Francisco office spreading yuletide spirit. "He's very people-oriented — he tries to make the workplace a pleasant place to be," Slavich says.

To keep in touch with staff working outside the head office, Howard spends about half his time traveling to large job sites in the U.S., Europe and Saudi Arabia. He meets with top management at each site, but he also makes a point of talking with end users to "let them know that there's someone who is looking out for them," he says.

At first blush, the diminutive Howard does not come off as a gregarious, hard-driving globe-trotter. But his mild-mannered nature belies an intensity for personal achievement that has exposed him to almost every side of the computer industry. A self-proclaimed "catalyst," Howard's enthusiasm for computing was first sparked in the mid-1960s at IBM, where he excelled in marketing and revenue planning positions.

Bitten by the entrepreneurial bug, he joined five buddies from Stanford University's Graduate School of Business and co-founded System Industries, Inc., a disk subsystems manufacturer in Sunnyvale, Calif. "Bill is soft-spoken, but he is very effective because he backs it up with pertinent facts, not bravado. He's very analytical," says Ed Zschau, a partner with venture capitalist Brentwood Associates in Menlo Park, Calif., and the chief founder of System Industries.

While Howard relies on seasoned professionals to carry out delegated responsibilities, he also emphasizes the need for an infusion of young blood into the company. "Younger people have damn good ideas, and they don't carry a lot of the old baggage of an earlier era with them; you need those kind of ideas to challenge the old ways," he says.

But a real problem, according to Howard, is the feeling among many of today's college graduates that success comes on a silver platter. Paying your dues is sometimes seen as a thing of the past.

"A lot of MBAs come out of college and they get a very high-paying first assignment, and they think that guarantees them entry to the executive suite," he says. "There has to be more patience — people still have to prove themselves."

The 'Godfather'

Howard has been proving himself at Bechtel for the last 15 years and shows no signs of letting up. Slavich describes him as the "Godfather" of Bechtel's new Information Technology Strategic Plan, a complex long-term mission to get the fragmented company on one integrated operating system with complete hardware and software standardization.

"Bill's strongest point is that he is always looking ahead in terms of where technology is going and where we should position ourselves so that we can be the most competitive," Slavich says.

Credited by his peers for being as much a salesman as a technological visionary, Howard spearheaded the development of Bechtel's commercial software business unit.

Howard says that selling a project or a piece of equipment to skeptical company end users demands a lot of talking, teaching and, perhaps most of all, listening to employees' concerns. As mayor and councilman in the Northern California town of Larkspur in the late 1970s, Howard spent much of his time listening to end users of a different sort.

But gearing up for tomorrow's hot technology often demands that the company shed or modify its present plans, Howard says. That can lead to frustration for the manager of information services, but Howard says most ordeals ultimately turn out satisfying: "It's a crazy business, but the information industry is about as exciting as you can get — you never get bored."

Lasky

CONTINUED FROM PAGE 65

sent to your boss. Being there enables you to listen, put yourself in another person's shoes and offer an explanation or suggestion. You have the opportunity to influence or control events and eliminate obstacles, or at least steer around them.

There is another important aspect to walking around that falls into the category of "little favors." You can get a lot of mileage out of meeting and talking with people, even if it's not related to specific projects. Helping others so they will help you is what it's all about.

By now, I've probably angered all those who worship the rigid, formal planning and control methodologies. There are hundreds of software packages to help you plan and control projects. I'm not minimizing the importance of those techniques. But they are not management: Management deals with getting people to do what you want done. To do that, you have to exercise control.

There are few managers who can exercise direct control — that is, give orders. What you have to do is win confidence so you can influence people and events. Management by walking lets you give and recieve information and take the pulse of an organization so you can exercise control and realize objectives.

Lasky is director of MIS for Dorr-Oliver, Inc. in Stamford, Conn.

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CALENDAR

JAN. 17-20

Third Conference on Hypercube Concurrent Computers and Applications. Pasadena, Calif., Jan. 19-20 — Contact: Patricia McLane, Jet Propulsion Laboratory, MS 180-205, Pasadena, Calif. 91109.

1988 Optical Disk Systems Conference. Phoenix, Jan. 20-22 — Contact: Jean O'Toole, CAP International, One Snow Road, Marshfield, Mass. 02050.

Third Annual Technology in The Law Practice: The Lawyer's Personal Workstation. Dallas, Jan. 20-23. — Contact: The Conference Desk, Inc., 3701 Fairmount St., Dallas, Texas 75219.

Military and Space Graphics: New Applications and Future Requirements. Cape Canaveral, Fla., Jan. 21. — Contact: Tanya Wilson, National Computer Graphics Association, Suite 200, 2722 Merrilee Drive, Fairfax, Va. 22031.

JAN. 21-30

Conference on Interactive Videodisk Systems. Clearwater, Fla., Jan. 24-26 — Contact: Institute for Graphic Communication, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

The Desktop Communications Conference. Anaheim, Calif., Jan. 25-27 — Contact: Infoserica, Inc., Desktop Communications Conference, Suite 100, 3235 Kifer Road, Santa Clara, Calif. 95051.

Measuring Quality and Productivity in a Data Processing Environment. Orlando, Fla., Jan. 25-27 — Contact: Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla. 32819.

Communications Networks '88. Washington, D.C., Jan. 25-28 — Contact: IDG Conference Management Group, P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.

Florida Instructional Computing Conference. Kissimmee, Fla., Jan. 25-28 — Contact: McRae and Co., P.O. Box 12187, Tallahassee, Fla. 32317.

Second Annual Conference on Improving Productivity in EDP System Development. Tucson, Ariz., Jan. 25-29 — Contact: Applied Computer Research, Inc., P.O. Box 9280, Phoenix, Ariz. 85068.

DB2/SQL Users Group Meeting. New York, Jan. 26 — Contact: DB2/SQL Users Bulletin, Box 560, Wall Street Station, New York, N.Y. 10005.

Logistex 88. Anaheim, Calif., Jan. 26-28 — Contact: The Material Handling Institute, Inc., Suite 201, 8720 Red Oak Blvd., Charlotte, N.C. 28210.

American Bankers Association 1988 National Security and Risk Management Conference. Orlando, Fla., Jan. 26-29 — Contact: Ed Atwood, ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

JAN. 31-FEB. 6

Financial Investment Management Exposition & Conference. Los Angeles, Feb. 2-3 — Contact: FIM-West, P.O. Box 4440, New York, N.Y. 10163.

Society for Computer Simulation Multiconference. San Diego, Feb. 3-5 — Contact: SCS, P.O. Box 17900, San Diego, Calif. 92117.

Strategic Planning for New Technologies: The Role of the Planner in the 1990s. Chicago, Feb. 5 — Contact: Aida Rivera, Executive Programs, 1221 Avenue of the Americas, New York, N.Y. 10020.

FEB. 7-13

Building an Effective Standards Program. Orlando, Fla., Feb. 9-10 — Contact Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla. 32819.

International Conference on Computers and Law. Santa Monica, Calif., Feb. 9-10 — Contact: Michael Krieger, ICCL 88, P.O. Box 24619, Los Angeles, Calif. 90024.

Focus on Operations-VIII: Profile of the Professional. Las Vegas, Feb. 9-11 — Contact: International Association for Computer Operations Managers, 742 E. Chapman Ave., Orange, Calif. 92666.

Data Storage Interface Week. San Jose, Calif., Feb. 8-12 — Contact: Technology Forums, Suite 260, 80 W. 78th St., Chanhassen, Minn. 55317.

CAP '88 Conference and Exhibition on Desktop and Workstation Publishing Systems. Washington, D.C., Feb. 9-11 — Contact: Computer Aided Publishing, Suite 200, 90 W. Montgomery Ave., Rockville, Md. 20850.

Usenix Technical Conference. Dallas, Feb. 9-12 — Contact: Usenix Conference Office, P.O. Box 385, 16951 Pacific Coast Highway, Sunset Beach, Calif. 90742.

Second Conference on Applied Natural Language Processing. Austin, Texas, Feb. 9-12 — Contact: Donald Walker, Bell Communications Research, MRE 2A379, 445 South St., Morristown, N.J. 07960.

Interex Computing Management Symposium. Anaheim, Calif., Feb. 10-13 — Contact: Interex Conference Department, 680 Almanor Ave., Sunnyvale, Calif. 94086.

FEB. 21-26

Dexpo East 88, The 14th DEC-Compatible Exposition & Conference. New York, Feb. 16-18 — Contact: Susan Wetmuch, Expocomm International, Inc., 3 Independence Way, Princeton, N.J. 08540.

Beecom '88. Paris, Feb. 16-19 — Contact: IDG Conference Management Group, P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.

FEB. 21-27

11th Annual Personal Computing Forum. Naples, Fla., Feb. 21-24 — Contact: Sylvia Franklin, Edventure Holdings, 375 Park Ave., New York, N.Y. 10152.

The Fifth Annual Electronic Printing Systems Conference. San Jose, Calif., Feb. 21-25 — Contact: S. Thomas Dunn, EPS '88 Conference Chairman, Suite 1, 1855 E. Vista Way, Vista, Calif. 92084.

Effective Methods for Data Processing Quality Assurance. Orlando, Fla., Feb. 22-24 — Contact: Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla. 32819.

Fourth Annual Computer Graphics New York. New York, Feb. 22-24 — Contact: David J. Small, Exhibition Marketing & Management Co., Suite 1110, 8300 Greensboro Drive, McLean, Va. 22102.

Vision Guidance For Robotic Systems. Cincinnati, Feb. 23-25 — Contact: Joanne Rogers, Special Programs, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

Interactive Instruction Delivery/Learning Technology in the Health Care Sciences. Kissimmee, Fla., Feb. 24-26 — Contact: Society for Applied Learning Technology, 50 Culpeper St., Warrenton, Va. 22186.

FEB. 28-MARCH 5

Telecom '88 Bank Telecommunications Conference. Bal Harbour, Fla., Feb. 28-March 2 — Contact: Ed Atwood, American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Third International Conference on CD ROM. Seattle, March 1-3 — Contact: Sherrie Eastman, Microsoft Corp., Box 97017, 16011 N.E. 36th Way, Redmond, Wash. 98073.

MARCH 6-12

2nd IEEE Conference on Computer Workstations. Santa Clara, Calif., March 7-10 — Contact: Computer Society of the IEEE, 1730 Massachusetts Ave. N.W., Washington, D.C. 20036.

Federal Office Systems Expo (FOSE) '88. Washington, D.C., March 7-10 — Contact: Debbie Murray, National Trade Productions, Inc., Suite 400, 2111 Eisenhower Ave., Alexandria, Va. 22314.

1988 Spring National Design Engineering Show and Conference. Chicago, March 7-10 — Contact: SNDES, 999 Summer St., Stamford, Conn. 06905.

COMPUTER INDUSTRY

INDUSTRY INSIGHT

Bohdan O. Szuprowicz

IBM deploys AI smarts

By default, IBM will become the dominant supplier of expert systems and associated services worldwide during the next few years because independent vendors have not been sufficiently responsive to end-user needs.

This conclusion was reached by New Science Associates, a South Norwalk, Conn.-based artificial intelligence market research firm. The pronouncement was made during the firm's second annual forum on expert systems strategies in Phoenix last month.

Intel 80386-based micros are particularly suitable for the development and deployment of cost-effective expert systems. New Science researchers claim that the increased use will drastically alter the complexion of expert systems markets. The firm estimates that two million

Continued on page 74

AT&T stakes 20% claim in Sun

Investment valued around $300 million; Cassoni to sit on Sun's board

BY ALAN ALPER
CW STAFF

MORRISTOWN, N.J. — Seeking to strengthen its budding relationship with Sun Microsystems, Inc., AT&T last week reached an agreement to acquire up to 20% of the technical workstation vendor over the next three years and gain a seat on Sun's board of directors.

At current stock prices, AT&T's proposed equity investment is valued at approximately $300 million. Vittorio Cassoni, president of AT&T's Data Systems Group, will be nominated to sit on Sun's board at the next directors' meeting in February, AT&T said.

"The intent is for Sun's principal relationship to be with AT&T," noted Bob Holder, director of business development for AT&T's Systems Development Group.

The agreement comes almost three months after the two firms agreed to jointly develop a computing platform based on Sun's Scalable Processor Architecture — a reduced instruction set computing architecture microprocessor — which will run AT&T's Unix System V. [CW, Oct. 26, 1987]. The two companies also agreed to merge Unix System V with Sun's version of the University of California at Berkeley's Unix 4.2.

The investment demonstrates to both potential customers and to the industry AT&T's commitment to the development agreement and ensures that Sun has the resources to fulfill its end of the deal, Holder said. Sun's stock value will likely increase as a result of the deal, a situation which will benefit AT&T as well as other stockholders, he added.

"We're better able to protect our investment, and Sun remains an independent company," Holder noted.

Analysts also interpreted the deal as positive for both firms. "Psychologically, this is good for AT&T," noted Ken Leon, an analyst with Bear, Stearns & Co. in New York. "It gives them greater credibility in the computer industry."

The deal enables Sun to raise money by selling its shares at a premium without actually losing control of the company, analysts pointed out. Given the recent volatility of the world's financial markets, this type of financing arrangement makes sound business sense, observers noted.

A Sun spokeswoman said proceeds would be used for additional research and development as well as for capital equipment and plant facilities.

Sun would have needed additional capital by late 1988, analysts said, because it would have been unable to rely on internally generated cash to fund its astronomical growth rate, which has exceeded 100% during the last two years.

"They'll need money, because a company eats up cash when it grows as rapidly as Sun has," noted Michael Orsak, an analyst with Robertson, Colman & Stephens, Inc.

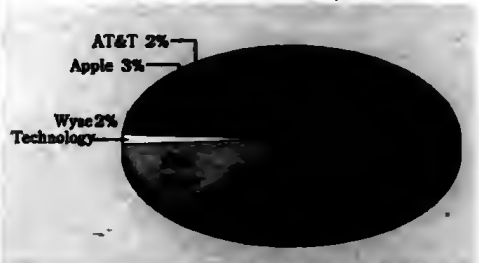
Sun has raised money twice during the last 14 months. A secondary public offering in November 1986 brought in $80 million, while a convertible subordinated debenture offering raised $100 million in February 1987.

In addition to AT&T's proposed stake, Eastman Kodak Co. also owns 4.5% of Sun.

Data View

Terminal market share: U.S. VAX sites

Terminals in use at DEC VAX sites, 1987



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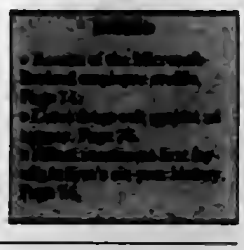

Deja vu at Software Publishing

BY STEPHEN JONES
CW STAFF

MOUNTAIN VIEW, Calif. — It is easy to see why Fred Gibbons might be experiencing a sense of deja vu these days.

Just four months after leaving his post as president of Software Publishing Corp. to become chairman of the company, Gibbons has been tapped to take over his old position and step down as chairman.

The management shuffle occurred abruptly at the end of last month, when former President Janelle Bedke unexpectedly resigned [CW, Jan. 4]. Formerly the chief of operations, Bedke had been president since August 1987. Gibbons resumed his job as president, and Jack Melchor, a longtime Software Publishing director, took over as chairman.

In an interview last week, Gibbons said he plans to follow most of the agenda that Bedke helped him develop. He said he will continue to pump up sales to corporate America with a new

Fred Gibbons

direct marketing sales force. He hopes corporate sales, which account for about 25% of the company's orders today, will double to 50% of total sales by 1990.

Like Bedke, Gibbons said connectivity to other software vendors' applications will increase. But he seemed less enthusiastic than Bedke about starting a line of products for Apple Computer, Inc.'s Macintosh.

Bedke, in an interview with *Computerworld* one week before her resignation, was determined to have Software Publishing develop or acquire new Mac products as early as 1989.

"Some of our products are just begging for the Mac interface," said Bedke, who alluded to the possible acquisition of a Mac product in 1988.

Gibbons, however, did not express the same interest. "We will consider the Mac, but only if we have extra resources — right now we have no plans for the Mac," he said.

Bedke's departure comes at a time when the once financially troubled company is showing signs of a rebound but has sent mixed signals to users.

While such events might be viewed as signs of instability, analysts remain optimistic about the company's future.

"I was surprised at the timing of Bedke's resignation, but I don't think it will hurt the company," said Will Edwards, an investment analyst with San Francisco-based Volpe & Covington. "The turnaround is in place, and it shows no signs of letting up."

Feds: Computer industry fastest growing in '88

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The U.S. computer industry is projected to continue its moderate recovery from the slump of 1986 with a 22% increase in sales in 1988, according to the federal government's annual "Industrial Outlook" report.

The U.S. Department of Commerce forecast put the computer industry in the No. 1 position on its list of predictions for the fastest growing industries in 1988. But the 22% figure, which represents a growth rate for the combined hardware and software industries, obscures big differences between the two industry segments.

Furthermore, the projections were based on optimistic economic assumptions, such as a 3.5% increase in the gross national product (GNP) in 1988, and were written before the Oct. 19, 1987 stock market crash. A November 1987 survey by the National Association of Business Economists predicted a 2.1% growth in the GNP for 1988.

The software industry is expected to grow at its regular rate of 24%, while hardware shipments should increase 10% in 1988, which is much lower than the compound annual rate of 18% experienced from 1972 to 1985. The value of hardware shipments declined nearly 4% in 1986 and began to recover last year with an 8% increase, the report said.

"The U.S. computer equipment industry has entered an era of heightened foreign competition, increasing product standardization, aggressive pricing and shorter product cycles," Commerce Department analysts said.

Continued on page 76

Microsoft-Borland scuffle could open exit door

BY STEPHEN JONES
CW STAFF

REDMOND, Wash. — Rob Dickerson's embattled but successful jump from Microsoft Corp. to a job with rival Borland International could open the exit door for other key Microsoft workers previously snagged by a strict "noncompete" employee agreement.

Microsoft tried to enforce the policy, which prohibits an employee from working for a competitor for at least one year after resigning, when Dickerson quit as languages manager Nov. 13, 1987. Borland challenged that policy in court, and the two companies reached an agreement last month that allowed Dickerson to work for Borland.

Although both sides claimed a mutual victory after the out-of-court settlement, analysts said Microsoft had more at stake than blocking a seepage of trade secrets to the competition.

'The short end'

"It looks like Microsoft got the short end of the deal," said Bruce Johnston, an analyst with First Boston Corp. in New York. "They tried to prevent an employee from working for a competitor, and that employee went ahead and worked for the competition anyway."

Borland and Dickerson contested Microsoft's noncompete policy in a U.S. District Court in California, charging that such a covenant was not enforceable outside of Washington, Microsoft's home state. Borland also made Microsoft out to be the bad guy in an impassioned statement that characterized the company as a bully attempting to "lock in its employees with restrictive hiring practices."

"It's hard to enforce that kind of employee agreement, particularly when you cross state lines, and that's what this [case] shows," Johnston said.

Although Microsoft workers may now be able to quit their jobs with more ease, they will not be going to Borland in the immediate future. As part of the settlement, both companies agreed they will not hire an employee from each other for the next six months.

Under the settlement, Dickerson will be prevented from participating in the development and marketing of all batch, macro or programming languages and related toolboxes for a period of nine months after his Nov. 14 start date at Borland.

Dickerson will be allowed to work with Turbo Pascal, Turbo Modula-2 and Turbo Prolog, according to the agreement. An independent micro software expert will be hired to monitor the implementation of the agreement.

Szuprowicz

CONTINUED FROM PAGE 73

386-based micros will be sold this year, 5% to 10% of which will be purchased primarily for expert systems development and applications. This may well account for about 60% of all expert systems hardware procurement in 1988. Workstations, minicomputers, mainframes and specialized LISP machines will make up the other 40%.

IBM is fully aware of these market shifts, which have already been exploited by DEC. DEC became a world leader in AI and expert systems hardware and applications during 1987, deriving about $150 million in revenue in these categories. Rumors emanating from European DEC sources also suggest that the company will come out with an expert system shell product of its own; these rumors were not denied by DEC executives at the New Science forum.

Focus on customer loyalty

A major IBM objective is to keep its users from switching to DEC equipment, and Big Blue is embarking on an ambitious program to become the dominant supplier of AI and expert systems technology in all industries. IBM is currently deploying teams of knowledge engineers to help clients develop strategic expert system applications at several hundred mainframe sites at which ESE products have already been installed.

IBM's AI Projects Office, which develops the company's expert systems market strategy, is believed to have the continuing attention of the highest management levels. The IBM AI committee has already made decisions to enhance ESE products, announced Knowledge Tool software and made special arrangements with Intellicorp for development of an IBM version of that vendor's KEE expert system shell to run on general-purpose mainframes.

New Science analysts say IBM is going to enhance its existing ESE shell by rewriting the system in C, making it much more easily embedded in mainstream data processing systems.

New Science says IBM will announce a 386-based PC version of its enhanced ESE early in the last half of 1988. When that happens, the expert systems market could skyrocket overnight — and give IBM a decided advantage over its competitors.

Szuprowicz is managing consultant of the expert systems practice at Computer Task Group, Inc.

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Lotus settles suit out of court

BY ED SCANNELL
CW STAFF

BOSTON — Lotus Development Corp. last week dropped its suit against Rossin Greenberg Seronick & Hill that accused the advertising company of peddling trade secrets to a competitor [CW, Dec. 14].

The out-of-court settlement included an apology to Lotus from Rossin Greenberg Seronick & Hill as well as a promise not to seek or perform work for any companies manufacturing or selling microcomputer software products for the next 10 months without first gaining Lotus's permission.

Lotus filed suit against the agency Dec. 11, accusing the firm of soliciting business from Microsoft Corp., a major Lotus competitor, by offering Microsoft confidential information about Lotus. The agency filed a countersuit claiming Lotus damaged its reputation.

"Given that Lotus started off saying we tried to sell trade secrets and ended up accepting written assurances we would have given them on Dec. 10, we're happy," said Neal Hill, president of Rossin.

In a prepared statement, Lotus President and Chief Executive Officer Jim Manzi said his company accepts the apology of Rossin Greenberg Seronick & Hill and is "grateful" to see the firm is committed to marketing its experience without using confidential information.

The cover of the four-page brochure Rossin sent to Microsoft, which was designed by two ex-Lotus account executives, read, "You have probably never thought about talking to an agency in Boston." On pages two and three, it said, "But since we know your competition's plans, shouldn't you think about taking a flyer?" The brochure's pocket contained plane tickets from Seattle, near Microsoft's base in Redmond, Wash., to Boston.

Hill said the point of the ad was to highlight the experience Rossin had with Lotus and that it could bring to bear on the Microsoft account, not to imply the company was offering trade secrets.

Alliant seeks overseas market

LITTLETON, Mass. — Seeking to channel its resources away from the U.S. and into overseas markets, Alliant Computer Systems Corp. last week announced the first layoffs in its six-year history.

The minisupercomputer maker plans to eliminate 40 jobs at its corporate headquarters but hire 50 international sales and support employees. "We've seen the U.S. market slow down substantially," Alliant President Ronald Gruner said. "We have to play a little catch-up overseas."

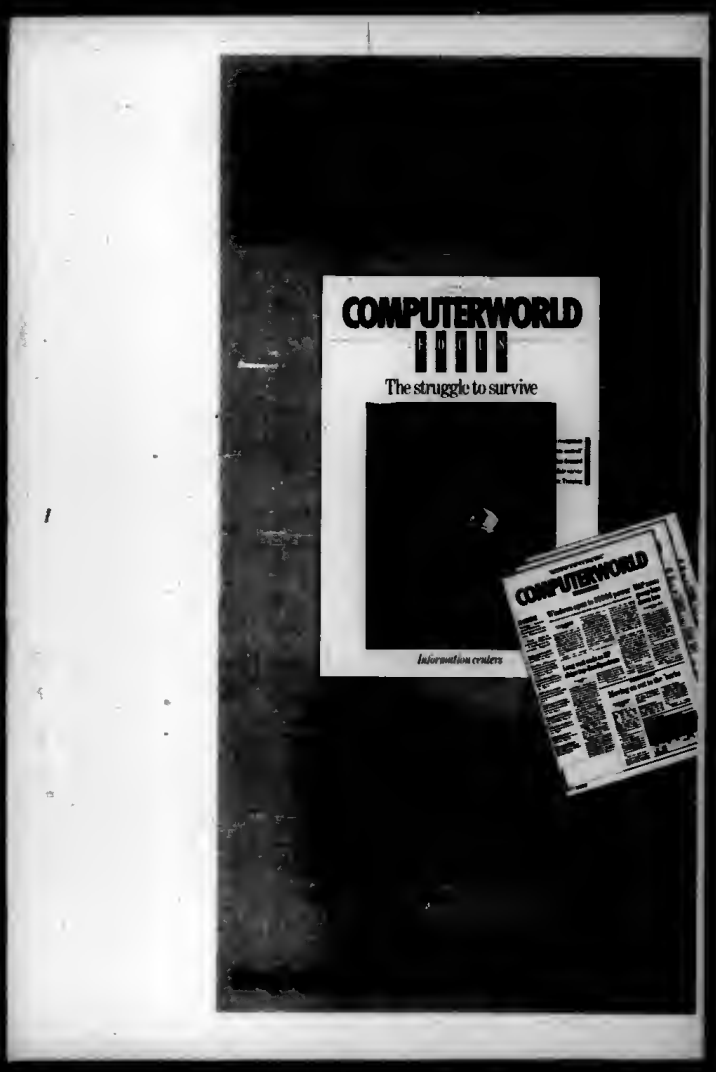
Alliant hired former Prime Computer, Inc. international sales chief Roger Parsons to head worldwide sales. Parsons was most recently president of Vmark, Inc., a software firm.

Industry

FROM PAGE 73

Sales of mainframes will grow only 5% (about the same as in 1987), sales of micros will grow 14%, and sales of supercomputers will grow 36% in 1988, the forecast said.

The report also made forecasts for several computer-related industries. For example, it said that although the market for data processing services has matured, some organizations still contract for remote processing. Revenues in this industry are expected to grow 13% in 1988, stimulated by activity in the financial services market. Also, revenues for computer professional services, such as custom programming, systems integration and consulting, will grow about 20%.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Knowledge of tools not mandatory

Dearth of experts causes companies to train applications programmers

BY MICHAEL BALL
SPECIAL TO CW

Despite the proliferation of application tools, including code generator and computer-aided software engineering (CASE) packages, companies looking for applications programmers are willing to train candidates for the position rather than expect them to possess expertise in the new methods.

"It would be great if we could find someone who is an expert with these tools, but we don't expect it," says James Lair, senior development center consultant with Dayton-Hudson Corp. in Minneapolis.

Code generators and CASE tools are so new and diverse that they currently affect the performance of the job much more than getting hired. "It's tough," says Betsy Behnke, a systems analyst at San Diego Gas & Electric Co. "The technology is changing so rapidly."

Programmers in demand

With a high demand for applications programmers on a variety of platforms, Behnke's company advertises nationwide and employs consultants while waiting for or training the right people. Regarding CASE tools, Behnke says, "We want people with experience, but it's very hard to find long-term experience. There are a lot of different types of tools, and we expect to train for a specific one on the job."

Likewise, Lair says, "a person walking in here has got a bigger task every year for getting trained and started." The new applications writing aids add yet another layer of complexity. "There is no standard CASE product," he says, "and we recognize that. It's not like Cobol or PL/I. People don't have lists of CASE products on their resumes yet."

Custom training

Bruce Sherman, a Minneapolis-based consultant, agrees. "I don't see a real demand for new skills. Most companies look for well-developed programming skills and teach specific tools on the job."

Companies are also looking for specific kinds of programming experience, he adds. "The hot spot seems to be front-end design tools," Sherman says. "A lot of companies want people who can create and maintain some kind of link with these. There's a lot of noise from data base administration about linking tools with data dictionaries and data depositories."

That sentiment was echoed by Steve Harrison, manager of systems development for Profit Freight Systems in Marietta, Ga. "We definitely look for data base experience," Harrison says.

> "IT WOULD be great if we could find someone who is an expert with these tools, but we don't expect it."
>
> JAMES LAIR
> DAYTON-HUDSON CORP.

At Profit, "we have divided things up," Harrison says. He uses one set of programmers that he calls "the typical Cobol droid" and another set experienced primarily in C for minicomputers and supermicros.

For the latter group particularly, the company is willing to provide training for specific packages, as long as the general skill sets are strong.

"We look for a lot of experience with a number of different languages, and we stay away from people who know only one thing," Harrison continues.

"The candidates who know only one language don't seem to be as innovative, particularly with the hybrid solutions that we often need in applications programming," he says.

Even in an established applications environment, basic skills come first and tool-specific expertise next, according to Bob Peddycord, manager of computer systems development at the Bowman Gray School of Medicine, Wake Forest University in Winston-Salem, N.C. His shop uses McCormack & Dodge Corp. development tools as well as financial packages, but when he next hires, Peddycord says he will look beyond those.

"Of course, I'd like to have someone with specific McCormack & Dodge experience," he says. "But just as important is good business experience, like payroll; someone who really knows what the users are talking about."

What the market will bear

Like other managers, Peddycord accepts that "we have to pay for the good programmers — they still demand top dollar." His perception is that even without the package-specific experience, the good applications programmers will be worth the investment.

In San Diego, Behnke's attitude is similar. She finds the local environment a little less competitive than the rest of California, but it is still one in which she must fight for applications programmers. "I know the Southeast is looking for a lot of people, as they are in Los Angeles," she says. Behnke adds that her utility pays 3% to 5% above the market rate to get the people it needs.

Although there is currently a good pool of programmers with general experience from which to draw, Behnke says that both the nature of the field and the demands of companies may change as the technology matures.

Similarly, Lair sees a greater emphasis on entity relations and data flow diagrams. The days of grinding out applications code may be waning.

"There are a lot of tools to help operations analysts, software maintenance people and those in the development area," he says. "Now when you go into a system to enhance it, there is a small amount of automation. Maybe in a few more years, we'll see people coming out of college with this experience."

Sherman says the nature of the programmer/analyst job is shifting to design and analysis. Code generators are taking over the monotony of writing code. In a few years, as the application programming trade settles on tools, companies will require brand name expertise to match, he says.

Ball is a free-lance writer based in Boston.

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Roger Fraumann
Staff Director
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Roger Fraumann is Staff Director for Lachman Associates, Inc. (LAI) of Westmont, Illinois. It is one of the largest privately held computer systems software consulting and development firms in the United States. And Roger is pleased to report that plans call for continuing the 50% annual growth every year for the next five years.

Roger is also pleased with Computerworld's contributions to the company's growth. When he needs qualified people to fill positions as the company grows, he turns to Computerworld.

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"We get about 20 responses per ad, and what really counts is that those responses yield at least two quality applicants per ad," Roger explains. *"Overall, a higher percentage of quality people respond to our ads in Computerworld, as opposed to what other publications deliver. Computerworld works for us."*

Plus, Roger has found added incentive to advertise in Computerworld: *"The same ad that runs nationally in Computerworld costs twice as much to run in the Chicago Tribune, a local newspaper,"* he notes.

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Bjorn Nordemo is Vice President of Data Arts & Sciences, Inc. (DASI), a contract software agency based in Weston, MA. Although they place people in permanent positions, DASI most often places 'contract programming personnel' — consultants who fit special niches for short or long term commitments in corporations in the New England area.

"Our agency specializes in finding computer consultants — designers of systems, evaluators of hardware and software requirements, and computer programmers to mention a few. We recently were introduced to Computerworld as a potential source for finding these consultants," states Bjorn. *"I liked the idea because I know Computerworld has a broad reach — from MIS/DP directors to computer programmers, in multiple industries and multiple markets — and that's what DASI needs."*

"We had four specific positions for MIS/DP consultants that we needed to fill in northern New England. We used the local newspaper on a weekly basis, but people who are willing to move usually aren't reading the local Sunday paper. So, I felt this was a perfect opportunity to try Computerworld," says Bjorn.

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And Bjorn also recognizes a second benefit to advertising in Computerworld. *"The beauty of using Computerworld is that it's read by people in the computer industry who have a need for consultants, as well as being read by consultants who need to keep up to date on the marketplace,"* says Bjorn. *"So we not only reach qualified candidates to fill our current openings, but we are creating awareness of the services that DASI has to offer,"* says Bjorn.

"We have some great plans for expansion and as we do, Computerworld is going to play a strong hand in helping us accomplish our goals," concludes Bjorn.

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*Analysis of Computerworld and selected major U.S. newspapers

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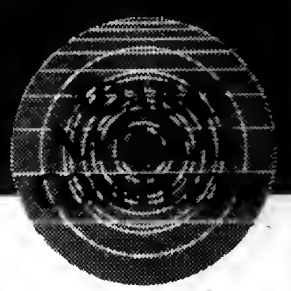

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MARKETPLACE

New year's flood brings tide of older DOS machines

BY ELIZABETH LOZANO
BOSTON COMPUTER EXCHANGE CORP.

Trading volume was high the first week of January as the flood of older DOS machines into the used market began.

IBM trading was flavored by volume deals. The Personal Computer closed even at $700, with matched supply and demand. The PC XT 10M-byte version closed off at $1,300. With prices and demand peaking during the last couple of months, the XT Model 089 dropped slightly, closing at $1,825, under pressure from an increase of supply. The AT Model 099 closed even this week. The AT Model 339, however, rose sharply, closing at $3,500.

In the Compaq Computer Corp. world, trading was sluggish. The only models that experienced high demand and volume the first week of this month were the Portable and Deskpro lines. The Portable I closed even at $725. The Portable II closed even at $1,700, with a marginal decrease in demand. The Compaq Plus closed up at $1,275, experiencing a mid-week supply shortage. The Deskpro 286 also closed up slightly, at $2,175, trading in lower volume than the AT Model 099. Compaq 386 trading was frantic. The Deskpro 386 closed up at $4,350.

Apple Computer, Inc. Macintosh trading maintained a steady pace. The Mac 512 closed up at $850. The 512E held steady at $1,000, with a notable lack of volume transactions. The Mac Plus recovered slightly from a dramatic fall at the end of December, closing at $1,325. The Mac SE and Mac II closed even at $1,900 and $4,000, respectively, with new street prices holding used prices at this level.

The Boston Computer Exchange can be reached at 617-542-4414.

The BoCoEx Index: Closing Prices Report

for the week ending January 1, 1988

IBM PC Model 076	$700	$875	$400
IBM XT Model 086	1,300	1,425	900
IBM XT Model 089	1,825	2,050	1,300
IBM AT Model 099	2,250	2,900	2,250
IBM AT Model 339	3,500	3,700	2,800
Macintosh 512	850	875	650
Macintosh 512E	1,000	1,100	875
Macintosh Plus	1,325	1,400	1,200
Macintosh SE	1,900	2,150	1,700
Macintosh II	4,000	4,200	3,500

INFORMATION PROVIDED BY THE BOSTON COMPUTER EXCHANGE

IBM terminal values spiral downward

BY NANCY DIPALMA
and MARY JACUBOWICZ
INTERNATIONAL DATA CORP.

The secondary market value of the IBM 3179 Model 1 is on the decline. Used values of this color display have dropped roughly $140 since early fourth-quarter 1987 as a result of end users displacing this box for IBM's new 3192 Model C replacement product. Market research firm International Data Corp.'s (IDC) secondary market contacts indicate that values for the 3179 Model 1 will eventually stabilize. IDC expects the terminal to remain a popular choice.

The used market for IBM's 3180 Model 110 monochrome display is in the same downward mode as the 3179 Model 1. Used prices for the Model 110 have dropped approximately $220 since the start of last year's fourth quarter. IDC anticipates used values for this monochrome display to continue dropping as end users remove their older 3180 Model 110 boxes and replace them with the 3192 display. This process will create an oversupply of 3180 Model 110 terminals on the secondary market, which in turn will put downward pressure on the Model 110's used prices.

In October 1987, IBM reduced purchase prices on the 3180 and 3179 System/34, 36 and 38 displays. The 3180 Models 210 and 220 were reduced by approximately 25%, from $1,695 to $1,235. The 3179 Models 200 and 220 were also reduced by roughly 25%, from $1,750 to $1,335.

As s result of this pricing action, used values for the 3180 Model 210 and the 3179 Model 200 have dropped roughly $200. The 3180 Model 220 and the 3179 Model 220 still remain scarce on the secondary market. According to IDC's third-party market sources, used values on the 3180 and 3179 System/34, 36 and 38 displays should match demand for the corresponding computer equipment.

The secondary market situation still remains dismal for the 3274 control units, as used values are still falling. The largest declines have been reported for the 41X models' used prices. Those values have dropped from $500 to $700 in only one month.

IDC can be reached at 617-872-8200.

IBM printer pricing

3800 Model 3	$289,000	First-quarter 1983	20,040 line/min	page, laser	67
4245 Model 12	$31,000	Third-quarter 1985	1,200 line/min	band, impact	78
3262 Model 3	$15,040	NA*	650 line/min	band, impact	50
5224 Model 2	$6,550	Third-quarter 1982	240 line/min	line matrix, impact	73

* Not available

INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.

Deals found in printer arena

BY NANCY DIPALMA
and MARY JACUBOWICZ
INTERNATIONAL DATA CORP.

The IBM 3268 Model 2 continues to decline in the used printer market. In the past 12 months, the printer declined 53%, from $5,074 last January to $2,360 now.

The serial matrix IBM 3287s are still in abundant supply in the secondary market. As a result, the market has been very competitive in its pricing of these printers.

IBM's 3800 Model 3 has experienced normal market fluctuation during the last few months. Deals reported on the native Model 3 have ranged from 73% to 50% of retail. The upgraded version of the Model 3 trades for approximately $50,000 less than the native model.

Used values on the IBM 4245 Model 20 remain high. There is a strong demand for this printer.

The IBM 4214 Model 2 has dropped in value recently. The secondary market has reported less interest in this printer and more in IBM's 4224, which offers users greater graphics capabilities. In November, the Model 2's fair market value was 91% of retail ($4,200); it is now trading at 74% of retail, or $3,400.

The holding trend persists for IBM 5224 and 5225 printers. For the past year, the value of these resonably priced System/34, 36 and 38 printers has been very stable.

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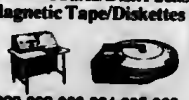

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Feb. 8	DEC-Compatible Software	Jan. 21
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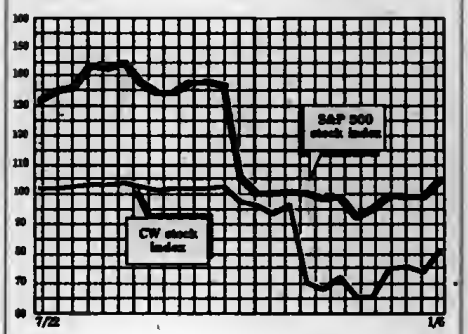
STOCK TRADING INDEX



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Communications	83.2	89.0
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Communications

Computer Systems

Software and DP Services

Semiconductors

Peripherals and Subsystems

Leasing Companies

CW CHARTS: AMY J. SWANSON

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JANUARY 6, 1988

EXCG		52 WEEK RANGE (1)		PRICE CLOSE JAN. 6 1988	WEEK NET CHANGE	WEEK PCT CHANGE
Communications and Network Services						
N	AMERICAN INFO TECHS CORP	100	74	85.25	1.38	1.64
Q	ANDREW CORP	19	11	14.50	1.00	7.41
Q	ARTEL COMM CORP	6	2	2.12	0.29	13.33
N	AT&T	30	20	28.25	0.75	2.73
Q	AVANT GARDE COMP INC	5	2	2.13	0.00	0.00
Q	AVANTEK INC	19	7	8.38	0.63	8.06
N	AYDIN CORP	28	16	19.25	0.38	1.99
N	BELL ATLANTIC CORP	80	61	67.00	2.00	3.08
N	BELLSOUTH CORP	44	29	37.13	0.63	1.71
Q	COMPRESSION LABS INC	5	2	3.38	1.13	40.91
Q	COMPUTER NETWORK TECH	6	2	1.94	0.12	6.89
Q	CONTEL CORP	40	29	30.00	1.25	4.35
Q	DATA SWITCH CORP	6	4	6.38	0.25	4.08
Q	DIGITAL COMM ASSOC	48	29	33.00	5.25	18.92
Q	FIBRONICS INT	28	12	20.75	0.50	2.47
Q	FIBRONICS INTERNATIONAL INC	11	2	2.50	-0.50	-16.67
Q	GYRATECH CORP	44	14	21.75	1.75	8.75
Q	GANDALF TECHNOLOGIES	11	5	8.50	0.13	1.88
Q	GENERAL DATACOMM INDS	14	3	4.12	0.00	0.00
N	GTE CORP	48	28	36.88	0.25	0.70
Q	INFOTRON SYS CORP	12	6	7.00	0.50	7.69
N	ITT CORP	58	42	47.25	3.00	6.75
S	M A COM INC	15	7	10.13	1.12	12.50
Q	MCI COMMUNICATIONS CORP	12	5	10.50	0.88	9.09
Q	MICOM SYS INC	18	7	8.75	1.13	14.75
Q	NETWORK SYS CORP	16	7	8.38	0.63	7.14
N	NORTHERN TELECOM LTD	24	14	18.88	1.25	7.09
Q	NOVELL INC	30	12	24.50	0.50	2.08
N	NYNEX CORP	75	58	69.00	1.50	2.36
N	PACIFIC TELESIS GROUP	34	6	26.50	0.38	0.41
S	PARADYNE CORP	5	4	4.12	0.25	6.45
A	PEPPER, COMP	6	1	3.38	1.50	42.11
N	PLESSEY PLC	41	23	28.50	1.75	6.31
N	SCIENTIFIC ATLANTA INC	20	6	11.88	0.63	5.60
N	SOUTHWESTERN BELL CORP	48	22	34.75	1.00	2.38
Q	3 COM CORP	29	12	21.38	1.13	5.60
Q	TIMEPLEX INC	21	17	18.50	2.25	8.77
Q	UNGERMANN BASS INC	16	5	7.88	0.63	8.62
N	U S WEST INC	60	43	61.25	1.25	2.50
Computer Systems						
Q	ALLIANT COMPUTER SYS	37	5	6.75	1.00	12.90
Q	ALPHA MICROSYSTEMS	6	3	4.50	0.25	5.88
Q	ALTOS COMPUTER SYS	17	6	12.12	0.75	6.60
A	AMDAHL CORP	50	19	36.63	1.63	4.64
Q	APOLLO COMPUTER INC	25	6	13.63	1.63	13.54
Q	APPLE COMPUTER INC	80	22	43.75	0.38	0.86
N	BOLT BERANEK & NEWMAN	30	12	17.80	0.75	4.40
Q	BRITTON LEE INC	5	1	1.88	0.12	10.00
N	COMPAQ COMPUTER CORP	75	21	59.00	2.38	4.16
Q	COMPUTER AUTOMATION INC	17	4	8.38	0.38	4.17
A	COMPUTER CONSOLES INC	12	2	8.63	2.00	55.17
Q	CONCURRENT COMP CORP	24	11	17.13	0.88	2.24
N	CONTROL DATA CORP DEL	39	18	23.25	1.25	5.68
Q	CONVERGENT TECH	12	2	4.38	0.44	11.10
Q	CONVEX COMPUTER CORP	22	5	8.88	0.50	5.97
N	DIGITAL EQUIP CORP	138	47	79.00	10.13	14.57
Q	DAISY SYS CORP	13	5	7.12	0.80	7.39
N	DATA GEN CORP	39	16	28.00	1.88	7.77
N	DATAPOINT CORP	6	2	4.63	-0.25	-5.12
S	DIGITAL EQUIP CORP	200	108	140.75	3.38	2.46
S	FLOATING POINT SYS INC	17	2	4.25	-0.13	-2.86
S	GOULD INC	34	6	12.63	1.12	9.76
S	HARRIS CORP	43	22	27.38	1.50	5.79
N	HEWLETT PACKARD CO	74	39	59.63	0.88	1.88
S	HONEYWELL INC	51	48	80.75	5.13	9.21
N	IBM	176	102	122.88	5.88	5.02
Q	INFORMATION INTL INC	17	5	10.75	0.75	7.50
Q	IPL SYS INC	3	2	2.00	-0.12	-5.88
Q	MASS COMPUTER CORP	14	5	6.25	1.25	25.00
N	MATSUSHITA ELEC INDL LTD	139	23	151.38	11.38	8.00
Q	MEGADATA CORP	7	3	3.63	-0.13	-3.33
Q	MENTOR GRAPHICS CORP	39	14	24.75	2.38	10.61
N	MSI INC	14	4	4.25	0.25	6.25
S	NCR CORP	87	48	86.12	2.88	4.55
S	PRIME COMPUTER INC	21	12	17.13	1.38	8.73
Q	PYRAMID TECHNOLOGY	12	6	8.50	0.50	6.25
Q	STRATUS COMPUTER	41	15	28.75	5.00	22.99
Q	SUN MICROSYSTEM INC	48	14	36.75	2.75	8.09
Q	SYNOPTICS INC	6	1	1.88	0.25	17.86
N	TANDEM COMPUTERS INC	38	16	27.63	1.00	3.75
N	TANDY CORP	57	38	35.75	2.25	6.72
N	ULTIMATE CORP	37	15	16.63	-0.78	-3.88
N	UNISYS CORP	48	24	35.88	2.00	5.90
A	WANG LABS INC	16	10	10.75	2.25	16.57
Software & DP Services						
Q	ADVANCED COMP TECH	6	1	2.00	0.00	0.00
N	ADVANCED SYS INC	35	16	21.00	0.00	0.00
S	AGS COMPUTERS INC	30	11	17.38	0.25	1.88
Q	AMERICAN MGMT SYS INC	20	6	15.38	1.88	13.89
Q	AMERICAN SOFTWARE INC	22	6	8.13	0.13	1.39
A	ANACOMP INC	11	4	7.38	0.88	13.46
Q	ANALYSTS INTL CORP	10	4	8.25	0.00	0.00
Q	ASHTON TATE	33	13	20.75	2.38	8.74
Q	ASK COMPUTER SYS INC	17	5	8.38	0.50	6.35
Q	AUTODESK INC	24	12	22.00	1.25	6.02
N	AUTO DATA PROCESSING	53	35	44.13	-0.75	-1.67
Q	BOOLE & BABBAGE INC	12	5	7.75	1.00	14.81
S	COMPUTER ASSOC INTL INC	37	15	30.88	0.13	0.41
Q	COMPUTER HORIZONS CORP	15	7	10.25	0.25	2.50
N	COMPUTER SCIENCES CORP	75	42	51.63	1.88	2.77
S	COMPUTER TASK GROUP INC	18	6	11.12	0.63	5.95
Q	COMSHARE INC	28	12	14.75	1.00	11.32
Q	CULLINET SOFTWARE INC	14	4	6.13	0.13	2.08
Q	CYCARE SYS INC	10	6	6.50	0.50	8.33
Q	DUQUESNE SYS INC	23	10	21.75	0.50	2.35
A	DATA ARCHITECTS, INC.	17	7	10.13	0.63	6.58
S	GENERAL MTRS (CLS E)	58	24	30.88	1.78	6.11
Q	HOGAN SYS INC	17	5	5.38	0.50	10.25
Q	INFORMIX CORP	31	11	23.75	-2.12	-8.21
Q	INTELLICORP INC	11	3	3.88	0.00	0.00
Q	JEANE INC	10	6	7.00	0.50	7.69
Q	LOTUS DEV CORP	40	17	33.50	1.75	5.51
Q	MANAGEMENT SCI AMER	21	5	8.75	0.75	12.50
Q	MICRO PRO INTL CORP	8	2	3.56	-0.06	-1.71
Q	MICROSOFT CORP	75	28	58.50	2.75	4.93
Q	MORINO ASSOCIATES INC	24	7	14	0.75	5.66
Q	NATIONAL DATA CORP	34	15	27.50	0.50	1.85
Q	ON LINE SOFTWARE INTL INC	22	5	12.00	2.25	23.08
Q	ORACLE SYS CORP	19	6	15.13	0.63	4.34
N	PANSOPHIC SYS INC	28	11	16.25	2.25	16.07
Q	POLICY MGMT SYS CORP	30	15	20.50	1.25	6.49
Q	PROGRAMMING & SYS INC	14	7	10.25	1.00	12.12
Q	REYNOLDS & REYNOLDS CO	29	14	17.88	1.88	8.33
Q	SEI CORP	15	10	15.75	-0.75	-4.55
Q	SHARED MED SYS CORP	63	15	23.75	1.13	4.97
Q	SOFTWARE AG SYSTEMS INC	16	5	8.38	0.00	0.00
Q	SOFTWARE PUBG CORP	17	6	8.25	-0.13	-1.88
A	STERLING SOFTWARE INC	14	6	7.00	1.00	16.36
Q	SUNGARD DATA SYS INC	21	10	16.00	2.25	16.39
Q	SYSTEMATICS INC	20	15	20.88	2.00	8.04
N	SYS. SOFT INC	24	7	15	0.75	5.48
Q	VM SOFTWARE INC	48	7	10.50	0.25	2.56
Semiconductors						
N	ADV MICRO DEVICES INC	25	5	16.75	0.75	7.80
S	ANALOG DEVICES INC	24	6	12.13	0.38	6.16
Q	ANALOGIC CORP	13	5	6.50	1.00	18.18
Q	INTEL CORP	42	14	28.75	2.00	7.48
Q	LSI LOGIC CORP	17	7	10.25	0.00	0.00
N	MOTOROLA INC	74	39	52.00	1.75	3.48
S	NATL SEMICONDUCTOR	22	10	12.50	0.25	2.04
S	TEXAS INSTRS INC	80	36	57.63	1.13	1.99
A	WESTERN DIGITAL CORP	33	12	16.75	0.38	2.29
Peripherals						
Q	ALLOY COMP.	12	4	4.75	0.88	8.57
N	AMINTL INC	5	3	6.38	0.75	16.22
Q	AST RESH INC	23	6	8.75	1.50	20.68
N	DECISION INDS CORP	12	4	10.75	0.63	20.00
Q	EASTMAN KODAK CO	71	42	51.88	1.88	3.75
Q	E M C CORP MASS	29	10	16.25	0.50	3.17
Q	EMULEX CORP	10	4	6.63	0.38	6.00
Q	EVANS & SUTHERLAND	40	18	24.00	1.75	7.87
Q	ICOT CORP	13	3	4.80	0.63	15.13
Q	INTERLEAF INC	24	5	16.75	0.25	1.88
Q	IOMEGA CORP	5	1	2.13	0.63	38.77
Q	LEE DATA CORP	10	5	6.16	0.44	15.93
Q	MASSTOR SYS CORP	6	1	2.12	0.25	13.33
Q	MAXTOR CORP	24	6	10.50	1.00	10.53
Q	MICROPOLIS CORP	44	12	25.25	1.25	5.21
Q	MINISCRIBE CORP	16	5	10.25	0.88	9.33
N	MINNESOTA MNG & MFG CO	84	65	66.00	2.25	3.53
A	MSI DATA CORP	24	12	20.25	1.75	9.46
Q	PRIAM CORP	6	1	2.00	0.25	14.29
Q	PRINTRONIX INC	13	7	8.75	0.38	4.48
S	QMS INC	27	11	11.80	-2.12	-16.88
Q	QUANTUM CORP	29	6	12.50	0.25	2.04
N	WANTEK CORP	6	2	2.88	0.63	19.23
N	RECOGNITION EQUIP INC	27	7	10.75	0.50	4.88
Q	REXON INC	14	6	6.50	0.63	10.64
Q	SCAN TRON CORP	17	7	10.75	0.63	6.17
Q	SEAGATE TECHNOLOGY	46	18	17.25	2.25	15.00
S	STORAGE TECH CORP	5	1	2.12	0.13	6.25
Q	TANDON CORP	7	2	1.94	0.25	14.81
A	TEC INC	7	2	6.88	0.63	11.90
N	TEKTRONIX INC	43	21	28.25	0.63	2.54
Q	TELEVIDEO SYS INC	3	1	1.38	0.06	4.72
N	TELEX CORP	102	30	56.75	-0.38	-0.67
Q	WYSE TECH	40	11	23.88	1.63	7.32
N	XEROX CORP	65	50	61.12	3.00	5.16
Q	XIDEX CORP	16	6	7.00	0.50	7.69
Leasing Companies						
Q	CAPITAL ASSOCIATES INTER-NATIONAL INC.	11	4	4.80	0.75	20.00
S	COMDISCO INC	37	12	20.38	1.12	6.54
S	CONTINENTAL INFO SYS	14	5	6.38	0.25	4.08
Q	PHOENIX AMERI INC	5	2	2.75	0.25	10.00
Q	SELECTERM INC	5	2	6.75	0.38	11.11

EXCH: N—NEW YORK; A—AMERICAN; Q—NATIONAL; O—OVER-THE-COUNTER; S—SPLIT

O-T-C PRICES ARE BID PRICES AS OF 2 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

What crash?

Market starts '88 with a bang; IBM leads high-tech charge

Computer stocks rang in the new year on a high note, as a 113-point, four-day advance in the Dow Jones industrial average fueled handsome gains in most leading issues.

IBM led the way with a rise of 7⅛ points to 123¾, while Digital Equipment Corp. picked up 6¾ points to 141¼ and Microsoft Corp. soared 6¼ points to 60½.

More modest gainers included Compaq Computer Corp., up 3⅛ points to 58½; Unisys Corp., up 2¼ points to 35⅝; Hewlett-Packard Co., up 2 points to 60¼; and Apple Computer, Inc., up 2½ points to 44½.

Cullinet Software, Inc. — which has been in the stock doldrums since the Oct. 19 crash — enjoyed an 18% rise in Thursday's trading to close at 7¼, up 1⅛ points for the four days.

Investors were encouraged by AT&T's intention to acquire up to 20% of Sun Microsystems, Inc. Sun jumped 7 points to 40½, and AT&T was up 2¼ points to 29¼.

Computervision Corp. edged up only ¼ of a point to 14⅛ as the market awaited its response to Prime Computer, Inc.'s $13.50-per-share tender offer, which it declined Friday morning. Prime rose 1⅛ points to 16⅛.

CLINTON WILDER

Pressure on CAD/CAM suppliers

Computervision rejects Prime offer, but shakeout seen as inevitable

BY ROSEMARY HAMILTON
CW STAFF

Prime Computer, Inc.'s bid to buy Computervision Corp. tells the story of the computer-aided design and manufacturing (CAD/CAM) market itself: For most companies, consolidation is now the key to success.

Industry analysts contacted last week said they expect the takeover to happen, noting that Computervision has little power to prevent the $13.50-per-share tender offer made to its shareholders. "I don't see a buyer with a better price waiting in the wings for them," said Raymond Reed, an analyst at Mabon, Nugent & Co.

Late last week, Computervision rejected Prime's bid "as inadequate and not in the best interests of Computervision" and urged shareholders to spurn Prime's offer for their stock. Computervision stock traded at $14 a share late Friday.

May seek white knight

According to the letter, Computervision will consider "the purchase of a substantial business by Computervision" and hinted that it would explore seeking a white knight to blunt Prime's advance.

A Prime spokesman said the company would not comment until it had seen a copy of Computervision's filing to the Securities and Exchange Commission.

Computervision's move came as "no surprise," said Laura Conigliaro, who follows the company for Prudential-Bache Securities, Inc. in New York.

The most important statement in the rejection letter, Conigliaro noted, might be the one between the lines: "What they're really saying is that they reject Prime's offer at that price."

Look out for No. 3

If Prime acquires Computervision, it will leapfrog almost a half-dozen competitors and become the third largest CAD/CAM vendor in the U.S.

Further, the combined effort would have a much better chance of competing against IBM and Digital Equipment Corp., which currently hold the No. 1 and No. 2 slots, respectively.

Prime has grown a respectable business in CAD/CAM. Of the firm's $860.2 million in revenue for 1986, 18% came from CAD/CAM sales. But Prime has remained far behind both IBM and DEC, which are rapidly approaching the $1 billion mark for their CAD/CAM businesses alone.

"The choice for Prime was to either take market share away from a competitor or buy it," said David Burdick, an analyst with Dataquest, Inc. in San Jose, Calif.

Unsettled market

A shakeout of the small niche players has been under way for at least two years. The Prime-Computervision deal would be by far the largest acquisition in this industry, but it actually follows 20 other consolidations that have occurred since the beginning of 1986, according to Vicki Brown, an analyst with International Data Corp. in Framingham, Mass.

Analysts said they expect more acquisitions in the future, although none quite as large as the expected Computervision purchase.

"The [CAD/CAM] industry is undergoing consolidation in the number of players," said Joe M. Henson, Prime's president and chief executive officer, in a recent interview. "That being the case, we made the judgment that we had to get larger, and it became attractive to examine external means of growth. . . . In our view, Computervision, even more than Prime, can't remain independent."

Most analysts said the acquisition makes sense because Prime and Computervision as a team have a much better survival rate.

"Prime was growing, but there was little hope that it would get critical mass. It just didn't have the resources to do that," Conigliaro said.

Takeover

CONTINUED FROM PAGE 1

ufacturing (CAD/CAM) market. As Prime President and Chief Executive Officer Joe M. Henson noted in his letter to Computervision President Robert Gable announcing the tender offer, Prime has repeatedly sought this merger on friendly terms.

So far, the scenario has unfolded in a manner similar to that of the computer industry's most significant unfriendly merger — the multibillion-dollar buy-out of Sperry Corp. by Burroughs Corp. to form Unisys Corp. in 1986. In a saga dating back to 1985, Burroughs Chairman W. Michael Blumenthal made it clear that he wanted a marriage with Sperry. When Sperry was cool to the idea and balked at the offering price in both 1985 and 1986, Blumenthal took his case directly to Sperry's shareholders, thereby crossing into hostile territory.

Last-ditch effort

For both Prime and Burroughs, the tender offer was a strategy of last resort. "Our industry tends to be very acquisitive in the first place," says Harvey Poppel, a principal with Broadview Associates, a Fort Lee, N.J.-based firm specializing in software and services industry marriages. "When there is a logical combination, most companies have the culture to recognize it, and there's no need for hostility."

Many industry observers felt computer vendors would become vulnerable targets as their stock prices plummeted Oct. 19; indeed, scores of vendors announced stock buy-back programs, partially as a takeover defense strategy. There was a brief flurry of three hostile tender offers in the industry at that time, but all three would-be acquirers failed to gain control of their targets.

Arbitrageur Asher B. Edelman, the computer industry's most notable raider (see chart), lost his battle for terminals maker Telex Corp. to a white knight offer from Memorex International N.V. Another white knight, venture capital entity Onset Corp., emerged to rescue mid-range peripherals vendor Decision Industries Corp. from the unwanted advances of leasing firm Econocom International N.V. And Digital Communications Associates, Inc., whose tender offer for Ungermann-Bass, Inc. was particularly timed to take advantage of the market crash, abandoned its takeover effort when its target resisted.

> "OUR INDUSTRY tends to be very acquisitive in the first place. When there is a logical combination, most companies have the culture to recognize it, and there's no need for hostility."
>
> HARVEY POPPEL
> BROADVIEW ASSOCIATES

Current financial market conditions include at least as many factors to *inhibit* hostile takeovers as to encourage them. The so-called junk bonds that have financed scores of hostile deals, including Sterling Software, Inc.'s stunning buy-out of much larger Informatics General Corp. in 1985, have fallen out of favor on Wall Street. Even before Memorex emerged as a bidder for Telex, observers were skeptical about Edelman's ability to fund a Telex takeover.

In addition, Broadview's Poppel points out that the end of the 1980s bull market removes a major spur to the hostile takeover frenzy. "The crash may discourage traditional raiders, because their favorite targets are laggards in a bull market," he says.

Although there have been notable exceptions, the conventional wisdom — that the computer vendor's typical assets of leading-edge technology and human expertise do not fit neatly into corporate raiders' financial formulas — will continue to keep the computer industry relatively free of hostile takeovers. The exceptions have occurred when the acquirer considered its target so crucial to its corporate — not financial — strategy that it was willing to risk the loss of key executives, managers and engineers from the target firm.

Apparently, that is what Prime thinks of Computervision. It is not unlike Computer Associates International, Inc.'s buy-out of Uccel Corp.; while Computer Associates did not have to launch a hostile takeover, it did pay a whopping premium for the dominant market share in key systems software markets.

"Prime is clearly taking a risk here, but it's worth it," says Don Bellomy, editor of International Data Corp.'s industry newsletter. "There are enough synergies in the CAD/CAM area that even a hostile offer for Computervision makes sense."

High-tech hostilities

Outcome of selected hostile takeover attempts involving computer companies

Year	Company	Hostile suitor	Result
1984	Management Assistance	Asher B. Edelman	Edelman wins proxy fight, sells off pieces of Management Assistance
1984	Mohawk Data Sciences	Asher B. Edelman	Mohawk gives Edelman control to ward off threatened buy-out; most of Mohawk is liquidated
1985	Datapoint	Asher B. Edelman	Edelman wins chairmanship of Datapoint, a position he still holds; Datapoint's service business is spun off as a separate independent maintenance firm, Intelogic Trace
1985	Informatics General	Sterling Software	Informatics agrees to a raised acquisition price after fighting earlier offers and becomes a division of Sterling; deal is notable as software industry's first hostile takeover and because Informatics is about five times larger than Sterling
1986	Sperry	Burroughs	Sperry eventually agrees to the industry's largest merger after failing to find a white knight; Unisys, the industry's second largest company, emerges
1987	Telex	Asher B. Edelman	Telex successfully fights off tender offer by agreeing to buy-out bid of white knight Memorex International
1987	Ungermann-Bass	Digital Communications Associates	DCA abandons proposed tender offer after Ungermann-Bass executives resist it
1987	Decision Industries	Econocom International	Econocom drops bid after Decision Industries agrees to white knight offer by venture capital entity Onset, whose offer still awaits shareholder approval

CW CHART

Cray

FROM PAGE 1

comes to supercomputers. ETA Systems, Inc., Honeywell-NEC Supercomputers, Inc. and Amdahl Corp./Fujitsu Ltd. are positioned as formidable competitors. Each of the vendors claims to offer high speed, fast processors and a commitment of technical support to users. More recently, IBM indicated its interest in the market through a partnership agreement backing former Cray designer Steve Chen's plans to develop a next generation of supercomputing machines [CW, Dec. 28, 1987/Jan. 4, 1988].

While comparable supercomputers are currently available, Cray officials boast that Cray dominates two-thirds of the market. With newer Crays on the horizon offering more engine power and performance, the company is branching out into disciplines beyond the military.

"Somehow, there is an aura of mystique surrounding the Cray just because it's a Cray," one user remarks.

Cray supercomputers were designed with the scientific community in mind. One Cray spokesman stresses that while the computers were initially purchased by the government, commercial users are finding other uses for Crays — including machines in the university, petroleum and aerospace arenas.

A typical sales pitch for a Cray would include mention of the system's effective implementation of vector processing, high-speed I/O throughput for computational mathematics and multitasking capabilities.

Super opportunity

Acquiring one of these systems brings great pride to users, who recognize that not everyone gets the chance to use a supercomputer.

"There is a certain amount of prestige attached to the fact that our scientists have access to one of the fastest computers in the world," says David Weber, manager of computing services at Illinois-based Argonne National Laboratories, a research lab operated by the U.S. Department of Energy (DOE) at the University of Chicago.

Currently testing the Cray X-MP/14, Weber stresses that if the acceptance test goes well, several hundred users out of its 2,000-member scientific community will be given the opportunity to log time on the $5.5 million Cray.

From the National Aeronautics and Space Administration's Ames research facility in Mountain View, Calif., approximately 692 scientists in 75 locations nationwide linked via Transmission Control Protocol/Internet Protocol networks are tapping the rich resource of the Cray-2, a 5,000-pound model with up to 2G bytes of main memory.

While it sounds like a large number, Lynda Haines, user liaison for the computer center, says that scientists must submit proposals to get the proper use clearance.

"It is a very valuable resource for us, and there is limited time on the machine," she says. "We want to make sure it is being used for only the state-of-the-art applications. There is quite a demand for it."

Housed in a separate room, the Cray is locked behind a series of doors for security reasons. "Much of what is on the Cray is of a proprietary nature. It is a great resource for us to have access to a special computer such as this, but it must be controlled," Haines adds.

Euphoric state

When the state of Alabama received its Cray X-MP/24 system, Boeing Computer Services, the vendor installing and operating the computer, was ecstatic.

The Cray is the crux of the new $39 million Alabama Supercomputer Network. The day it arrived, Boeing dashed off press releases all over the country announcing the date and exact arrival time of its new 5,000-pound bundle of joy. "We had TV cameras and lots of news coverage when it arrived in Huntsville," says James Woodward, chairman of the Alabama Supercomputer Authority and senior vice-president at the University of Alabama in Birmingham. "It was the biggest news in north Alabama."

When you have a computer system estimated to offer 12,000 times the power of a PC, using the Cray for basic word processing and spreadsheet analysis is as inappropriate as putting ketchup on filet mignon.

At the General Motors technical center in Warren, Mich., some 300 scientists and engineers are using a Cray X-MP/24 to help GM design the "Ultimate Car." George Dodd, chief of the computer science department, says some applications include examining aerodynamics, smoke combustion, structural mechanics and physics of the atmosphere, including ozone layers and smog content.

Lynda Haines of the Ames research center *displays the 5,000-pound Cray-2, housed in a high-security room at the facility.*

Via computer modeling, the scientists are able to simulate a wind tunnel with a car driving through it. "We can test for drag, forces on the car and engine cooling. We can do full-scale engineering before the prototype is developed," Dodd says. Engineers are using the Cray to come up with design concepts for new vehicles.

Of course we need one

Ask users why they need a Cray instead of a commercially available mainframe, and they might get indignant.

"If you go with a smaller computer, you're spending all the time maniuplating memory and moving data," Dodd explains. "You are not spending time computing."

The Cray is necessary for very heavy computation, be adds. And with applications as long and complex as GM's, running applications on IBM 3081s and 3090s was not practical.

"The jobs we ran on those machines were so big that it took two weeks to get the answer," he says. "You can't do serious research on that basis."

Today, those two weeks of wait-time are whittled down to a few hours. Dodd says the arrival of the Cray has changed the thinking of the staff. The style of research and sense of urgency has also been improved.

The power and speed of the Cray cannot be underestimated. "The biggest thing we needed was speed," says one anonymous user at Sandia National Laboratories in Albuquerque, N.M., which operates under the DOE. "We need a lot of number crunching around here."

Speed's their creed

Now the Cray is executing tasks five times faster than the former IBM 3033 and 3042 machines. In some cases, applications run 20 to 40 times faster, the user says. At two Sandia Laboratory sites, five Crays are in operation.

The laboratory, which performs research on both nuclear and solar energy, simulates things impractical to test, he says. "We find out how materials perform under stress and see how fluids and gases interact."

A Cray user for more than five years, the user stresses that Crays are used for the mass storage capabilities that are required under the lab's DOE-specific operating system.

When one Du Pont Co. chemical engineer got a computer job done in three minutes on the Cray instead of one hour on the IBM, "he was walking on air," says Fred Van-Catledge, senior specialist at Du Pont's scientific computing division in Wilmington, Del.

Du Pont, a premier Cray user for chemical research, takes advantage of the systems' power to perform complex computational calculations in the development of such products as herbicides and drugs. From their desktop terminals, linked to the Cray, the chemical engineers are able to measure the vibration of an atom and examine the shape of molecules.

Preparing the site

Because the Cray is a complex machine, it has a few unusual features. For one thing, Freon coolant is required with the X-MP/14. The Cray is so sophisticated that users often prefer to sign a maintenance agreement to have Cray personnel perform any changes or additions. At Sandia Laboratories, there is at least one full-time Cray systems engineer on-site.

While mainframes are massive, Crays tend to be even heavier. They weigh anywhere from 5,000 to 11,000 pounds. When Du Pont received its X-MP/24 this month, John Taylor, manager of the Du Pont scientific computing division, says, the department had to run a test on the elevator to make sure it could lift the giant machine to the third floor for installation.

Contrary to popular belief, the Cray is no harder to install than a mainframe, notes Pete Dubois, a system manager at Lawrence Livermore National Laboratory in Livermore, Calif. "We make sure that each machine gets a minimal two-hour checkup once a month. We are finding that with our Crays, that is more than adequate."

And like other mainframes, Crays are expensive to operate. It cost Du Pont $200,000 a month to maintain a Cray 1A, Taylor notes. "It costs us $14,000 a month in electricity alone," he adds. Taylor expects that it will cost $400,000 a month to maintain the new X-MP/24, which will replace the older model.

User unfriendly?

Experienced mainframe computer users at Du Pont and GM have found learning the Cray quite simple. But for the novice user, the Cray software environment does not boast a user-friendly interface.

Under Alabama's contract with Boeing, Boeing must train state staff and university employees — and throw in $40,000 worth of computer time.

"Nowadays, a lot of our chemists and physicists are taking up computer science just to learn how to use a supercomputer," Woodward says. "You cannot tap the power of the Cray until you know its architecture. A bicycle and a race car both are modes of transportation, but you have to learn the unique system."

Unlike other places, where getting access to a Cray can be difficult, novice users are encouraged to use the sophisticated hardware. "This is how they are going to learn," Woodward says. "It's not a useful resource if it is hard to get to."

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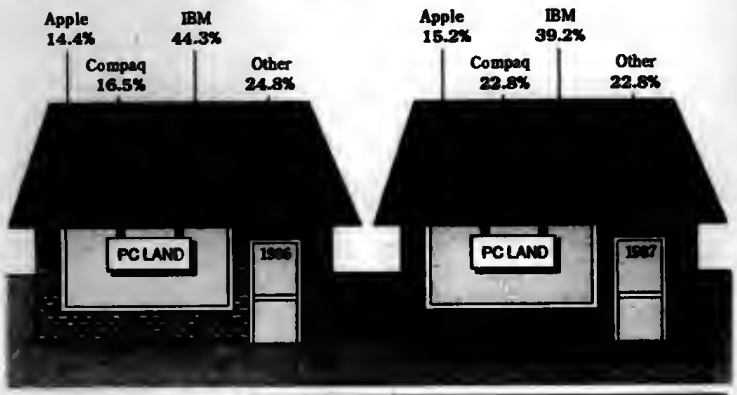
TRENDS

Personal computers

Compaq builds up retail market share

PERCENT OF DOLLAR SALES IN COMPUTER RETAIL STORES, JANUARY THROUGH NOVEMBER



While IBM continued to hold the largest chunk of retail dollars in the personal computer market in 1987, rival Compaq Computer Corp. gobbled up more of the computer giant's market.

IBM's dollar share in the retail market dropped to 39.2% in 1987 from 44.3% the year before. Meanwhile, Compaq climbed to 22.8% in 1987 from 16.5% the previous year.

These figures come from a survey conducted by research firm Storeboard, Inc. in Dallas, which bases its calculations on monthly responses from 400 to 450 retail stores. The firm mails out some 3,500 surveys each month to computer specialty stores.

The survey does not monitor direct sales, which make up approximately one-fifth of IBM's sales, nor does it include sales of value-added resellers or manufacturer-owned retail stores, according to JoeAnn Stahel, vice-president of Storeboard.

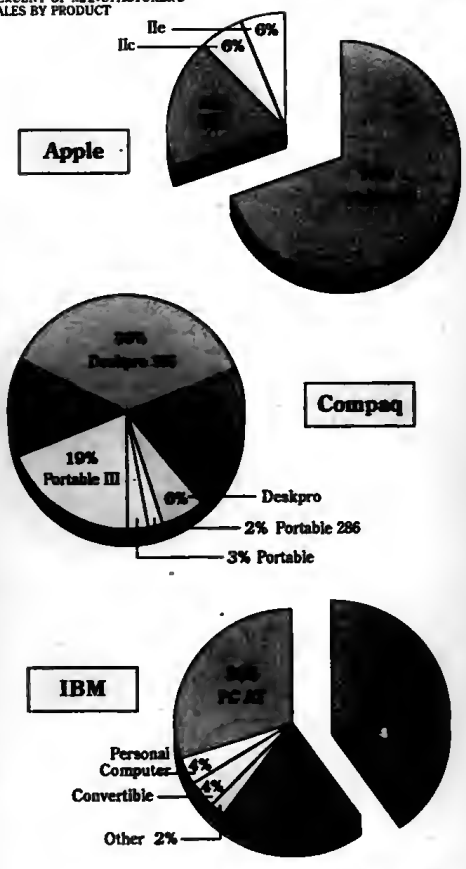
According to the results, which cover the period of January to November for each year, Apple Computer, Inc.'s dollar share rose modestly from 14.4% in 1986 to 15.2% in 1987. Other vendors accounted for 24.8% of dollar sales in 1986 and 22.8% in 1987, the survey showed.

Compaq's 22.8% dollar share last year was aided by sales of the company's Deskpro 386 computer, which made up 35% of Compaq's dollar volume, the study showed. And Apple could credit its Macintosh with about 70% of its dollar sales during the same period.

ALAN J. RYAN

Macintosh, PS/2 the new flagships

PERCENT OF MANUFACTURER'S SALES BY PRODUCT



INFORMATION PROVIDED BY STOREBOARD, INC.
CW CHARTS: AMY J. SWANSON

INSIDE LINES

Will they or won't they? The industry was abuzz last week, speculating about what Ashton-Tate will announce Wednesday. Sources said Microsoft and Sybase will join Ashton-Tate in announcing plans for a joint development project to put a relational data base on Apple's Macintosh. One source added that Ashton-Tate will announce agreements with both Apple and DEC. Many are betting that the company is close to signing an agreement to license Interbase Software's SQL data base, but Interbase told an analyst last week that although a deal is in the works, it will not be announced this week. The same analyst was told that neither Ashton-Tate's Dbase IV nor Dbase for the DEC VAX will be announced.

Try this on for size. Some observers, including a source close to Microsoft, say Ashton-Tate will announce support for the OS/2 LAN Manager, which is being developed by Microsoft and 3Com. Sources also speculate that Ashton-Tate will bundle Apex's Front Runner, which creates memory-resident Dbase-compatible programs, introduce a presentation graphics program developed by Decision Resources and unveil a new version of Framework. Much of this could turn out to be the work of overactive imaginations, but it gives some indication that the Taters are finally on the move. It must be big, though; the firm will have its four top executives at the New York press conference.

Is it reel? At a time when cartridge and cassette tape technologies are moving into the prime of their product cycles — with large systems vendors offering or developing cartridge drives and cassettes handling increasingly larger capacities on small systems — BASF offers a new reason to abandon reel-to-reel technology. BASF hiked prices by 7% on its reel-to-reel computer tape products effective Jan. 1.

Plug it in. More than two years after the IBM 3480 tape-cartridge drive first appeared on the scene, National Advanced Systems has begun to ship its IBM 3480 look-alike. Called the NAS 7480, the $41,000 drive ($62,000 for the controller/drive unit) was shipped in the U.S. and Europe just before Christmas. A spokesman said 12 sites had the drives, but he wouldn't say how many drive units had been installed. Volume shipments aren't expected until June.

Thinking big. A Verbatim Corp. spokesman last week said the company's planned single-sided 50M-byte 3½-in. erasable floppy disk will enter mass production this year. It will likely hit the OEM marketplace early next year and should be available to the general public by mid-1989. The disk itself, with a 70-msec access time including latency, will be priced at around $100, but the drive to run it will cost 10% to 20% more than a comparable Winchester disk drive, the spokesman said. A double-sided 100M-byte disk is in the planning stages, the spokesman said.

Out of the lineup. Chris Herot, who was a major influence in shaping Javelin Software's Javelin, has left the company. Herot is now working for Bit Stream, a Cambridge, Mass.-based digitized type foundry, as vice-president of development. At press time, there was no word from Javelin as to whether the company had found a replacement.

Climb aboard. Microsoft's OS/2 LAN Manager is expected to gain its second OEM next week, when Ungermann-Bass announces plans to license that technology and incorporate it into its Net/One family, according to a source close to Microsoft. "It's about time they announced it," the source said. "There was never any question that they would pick it up." Also hot from the rumor mills are reports that Ungermann-Bass will announce a T1 bridge to compete with rival Bridge Communications and/or the specifications for the Transmission Control Protocol/Internet Protocol drivers it developed for Apple.

Asking for trouble? For reasons best known to itself, Northern Telecom is slated to announce an IBM-compatible front-end processor this quarter, according to an industry source. The source, who requested anonymity, downplayed the switch vendor's chances in a market niche that has already proven rocky for Amdahl and NCR Comten.

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